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Central Food Technological
Research Institute, Mysore,
CSIR, India.



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572 012 India

ABBREVIATIONS

A	ampere	g	gram	rev/min	revolutions per minute
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PAPAYA IN INDIA: A MONOGRAPH

This 44 page monograph contains information on specific cultural features, varietal characteristics glimpses of fruit chemistry, manufacture and specifications of papain, recovery of pectin and a host of new processed product possibilities. Modular prospect details have been provided for latex production, manifestation of tutti-frutti and fruit bars. Some essential information has been included on suppliers of equipment and also papain.

Price: Rs. 20.00 (Postage extra)

GRAPES IN INDIA: PRODUCTION, PRESERVATION AND PROCESSING

This 34 page industrial monograph, the second in the series, presents information on Indian grapes covering distribution, cultivation, varieties, harvesting, yield, chemical composition, packaging, transportation, storage and export. Physiological disorders and fungal diseases of the berries are highlighted. Sections dealing with processing have focussed on unfermented beverages (juice, juice concentrates, squash, syrup), wines and raisins. A list of 82 selected references, glossary of terms, addresses of equipment manufacturers and a tentative cost estimate for grape dehydration is also provided.

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Please write to:

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ABBREVIATIONS

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AAS	atomic absorption spectrometry
abstr.	abstract
ad lib.	ad libitum
ADP	adenosine diphosphate
Anon.	Anonymous
AOAC	Association of Official Analytical Chemists
approx.	approximately
atm	atmosphere
ATP	adenosine triphosphate
a_w	water activity
BHA	butylated hydroxyanisole
BHT	butylated hydroxytoluene
BOD	biological oxygen demand
b.p.	boiling point
Btu	British thermal unit
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cal	calorie
cd	candela
Ci	curie
CMC	carboxymethyl cellulose
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conc.	concentrated
concn.	concentration
cv.	cultivar
cwt	hundredweight
d-	deci-
DE	dextrose equivalent
detn.	determination
DFD	dark firm dry
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dil.	dilute
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FDA	Food and Drug Administration
FID	flame ionization detection
fl oz	fluid ounce
f.p.	freezing point
ft	foot, feet

g	gram
GC	gas chromatography
gn	gravity
gal	gallon
gf	gram-force
GLC	gas-liquid chromatography
h	hour
ha	hectare
HDPE	high density polyethylene
hl	hectolitre (100 l)
hp	horse power
HPLC	high performance/pressure liquid chromatography
HTST	high temperature short time
Hz	hertz (frequency cycles/s)
in	inch
IR	infrared
IU	international unit
J	joule
k-	kilo- (as in kcal, kg)
K	Kelvin
l	litre
lb	pound
lbf	pound-force
LDPE	low density polyethylene
m-	milli- (as in mg, ml, mm)
m-equiv	milli-equivalent
M	molar concentration
M-	mega- (as in Mrad)
max.	maximum
min	minute (time)
min.	minimum
mol	mole
mol.wt.	molecular weight
m.p.	melting point
MPN	most probable number
MS	mass-spectrometry
n-	nano- (10 ⁻⁹ , as in nm)
N	Newton (kg m/s ²)
N.	North, Northern, etc.
	normal concentration
NMR	nuclear magnetic resonance
NPU	net protein utilization
oz	ounce
p-	pico- (10 ⁻¹² , as in pCi)
P	Poise
P	probability
Pa	Pascal (N/m ²)
PAGE	polyacrylamide gel electrophoresis
PER	protein efficiency ratio
p.p.b.	parts per billion
p.p.m.	parts per million
PSE	pale soft exudative
PTFE	polytetrafluorethylene
PVC	polyvinyl chloride
PVDC	polyvinylidene chloride
qt	quart
R	rontgen
rad	rad or radian
ref.	reference(s)

rev/min	revolutions per minute
RH	relative humidity
RNA	ribonucleic acid(s)
S.	South, Southern, etc.
s.d.	standard deviation
SDS	sodium dodecylsulphate
s.e.	standard error
s	second (time)
SNF	solids-not-fat
sp., spp.	species
sp.gr.	specific gravity
summ.	summary
Suppl.	Supplement
t	metric tonne
temp.	temperature
TLC	thin layer chromatography
TS	total solids
UHT	ultra-high temperature
UV	ultraviolet
V	volt
var.	variety
vol.	volume
v/v	volume/volume
W	watt
W.	West, Western, etc.
WHO	World Health Organization
w/v	weight/volume
wk	week
wt.	weight
yd	yard
yr	year
μ	micro- (as in μg, μm)
%	per centum
>	greater than
≥	greater than or equal to; not less than
<	less than
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AOAC	Association of Official Analytical Chemists	h	hour	s.e.	standard error
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atm	atmosphere	HDPE	high density polyethylene	SNF	solids-not-fat
ATP	adenosine triphosphate	hl	hectolitre (100 l)	sp., spp.	species
a_w	water activity	hp	horse power	sp.gr.	specific gravity
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BHT	butylated hydroxytoluene	HTST	high temperature short time	Suppl.	Supplement
BOD	biological oxygen demand	Hz	hertz (frequency cycles/s)	t	metric tonne
b.p.	boiling point	in	inch	temp.	temperature
Btu	British thermal unit	IR	infrared	TLC	thin layer chromatography
c-	centi- (as in cm, cm ² , cm ³)	IU	international unit	TS	total solids
cal	calorie	J	joule	UHT	ultra-high temperature
cd	candela	k-	kilo- (as in kcal, kg)	UV	ultraviolet
Ci	curie	K	Kelvin	V	volt
CMC	carboxymethyl cellulose	l	litre	var.	variety
COD	chemical oxygen demand	lb	pound	vol.	volume
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conc.	concentrated	LDPE	low density polyethylene	W	watt
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cv.	cultivar	m-equiv	milli-equivalent	WHO	World Health Organization
cwt	hundredweight	M	mega- (as in Mrad)	w/v	weight/volume
d-	deci-	max.	maximum	wk	week
DE	dextrose equivalent	min	minute (time)	wt.	weight
detn.	determination	min.	minimum	yd	yard
DFD	dark firm dry	mol	mole	yr	year
diam.	diameter	mol.wt.	molecular weight	μ	micro- (as in μ g, μ m)
dil.	dilute	m.p.	melting point	%	per centum
DM	dry matter, Deutsche Mark	MPN	most probable number	>	greater than
DNA	deoxyribonucleic acid(s)	MS	mass-spectrometry	$\geq$	greater than or equal to; not less than
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E.	East, Eastern, etc.	N	Newton (kg m/s ²)	$\leq$	less than or equal to; not greater than
ECD.	electron capture detection	N.	North, Northern, etc.		
EDTA	ethylenediaminetetraacetic acid	NMR	normal concentration nuclear magnetic resonance		
Eh	oxidation-reduction potential	NPU	net protein utilization		
ELISA	enzyme-linked immunosorbent assay	oz	ounce		
f-	femto- (10 ⁻¹⁵ , as in fCi)	p-	pico- (10 ⁻¹² , as in pCi)		
°F	degree Fahrenheit	P	Poise		
FAO	Food and Agricultural Organization	Pa	Pascal (N/m ²)		
FDA	Food and Drug Administration	PAGE	polyacrylamide gel electrophoresis		
FID	flame ionization detection	PER	protein efficiency ratio		
fl oz	fluid ounce	p.p.b.	parts per billion		
f.p.	freezing point	p.p.m.	parts per million		
ft	foot, feet	PSE	pale soft exudative		
		PTFE	polytetrafluorethylene		
		PVC	polyvinyl chloride		
		PVDC	polyvinylidene chloride		
		qt	quart		
		R	rontgen		
		rad	rad or radian		
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Suppl.	Supplement
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UHT	ultra-high temperature
UV	ultraviolet
V	volt
var.	variety
vol.	volume
v/v	volume/volume
W	watt
W.	West, Western, etc.
WHO	World Health Organization
w/v	weight/volume
wk	week
wt.	weight
yd	yard
yr	year
μ	micro- (as in μg, μm)
%	per centum
>	greater than
≥	greater than or equal to; not less than
<	less than
≤	less than or equal to; not greater than

Chemical symbols are used for all elements.

ABBREVIATIONS FOR LANGUAGES

	Language of text
Dutch	Nl
French	Fr
German	De
Italian	It
Japanese	Ja
Norwegian	No
Spanish	Es
Swedish	Sv

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ABBREVIATIONS

A	ampere
AAS	atomic absorption spectrometry
abstr.	abstract
ad lib.	ad libitum
ADP	adenosine diphosphate
Anon.	Anonymous
AOAC	Association of Official Analytical Chemists
approx.	approximately
atm	atmosphere
ATP	adenosine triphosphate
a_w	water activity
BHA	butylated hydroxyanisole
BHT	butylated hydroxytoluene
BOD	biological oxygen demand
b.p.	boiling point
Btu	British thermal unit
c-	centi- (as in cm, cm ² , cm ³)
cal	calorie
cd	candela
Ci	curie
CMC	carboxymethyl cellulose
COD	chemical oxygen demand
coeff.	coefficient
conc.	concentrated
concn.	concentration
cv.	cultivar
cwt	hundredweight
d-	deci-
DE	dextrose equivalent
detn.	determination
DFD	dark firm dry
diam.	diameter
dil.	dilute
DM	dry matter, Deutsche Mark
DNA	deoxyribonucleic acid(s)
dyn	dyne
E.	East, Eastern, etc.
ECD.	electron capture detection
EDTA	ethylenediaminetetraacetic acid
Eh	oxidation-reduction potential
ELISA	enzyme-linked immunosorbent assay
f-	femto- (10 ⁻¹⁵ , as in fCi)
°F	degree Fahrenheit
FAO	Food and Agricultural Organization
FDA	Food and Drug Administration
FID	flame ionization detection
fl oz	fluid ounce
f.p.	freezing point
ft	foot, feet

g	gram
GC	gas chromatography
gn	gravity
gal	gallon
gf	gram-force
GLC	gas-liquid chromatography
h	hour
ha	hectare
HDPE	high density polyethylene
hl	hectolitre (100 l)
hp	horse power
HPLC	high performance/pressure liquid chromatography
HTST	high temperature short time
Hz	hertz (frequency cycles/s)
in	inch
IR	infrared
IU	international unit
J	joule
k-	kilo- (as in kcal, kg)
K	Kelvin
l	litre
lb	pound
lbf	pound-force
LDPE	low density polyethylene
m-	milli- (as in mg, ml, mm)
m-equiv	milli-equivalent
M	molar concentration
M-	mega- (as in Mrad)
max.	maximum
min	minute (time)
min.	minimum
mol	mole
mol.wt.	molecular weight
m.p.	melting point
MPN	most probable number
MS	mass-spectrometry
n-	nano- (10 ⁻⁹ , as in nm)
N	Newton (kg m/s ²)
N.	North, Northern, etc.
NMR	normal concentration nuclear magnetic resonance
NPU	net protein utilization
oz	ounce
p-	pico- (10 ⁻¹² , as in pCi)
P	Poise
P	probability
Pa	Pascal (N/m ²)
PAGE	polyacrylamide gel electrophoresis
PER	protein efficiency ratio
P.p.b.	parts per billion
P.p.m.	parts per million
PSE	pale soft exudative
PTFE	polytetrafluorethylene
PVC	polyvinyl chloride
PVDC	polyvinylidene chloride
qt	quart
R	rontgen
rad	rad or radian
ref.	reference(s)

rev/min	revolutions per minute
RH	relative humidity
RNA	ribonucleic acid(s)
S.	South, Southern, etc.
s.d.	standard deviation
SDS	sodium dodecylsulphate
s.e.	standard error
s	second (time)
SNF	solids-not-fat
sp., spp.	species
sp.gr.	specific gravity
summ.	summary
Suppl.	Supplement
t	metric tonne
temp.	temperature
TLC	thin layer chromatography
TS	total solids
UHT	ultra-high temperature
UV	ultraviolet
V	volt
var.	variety
vol.	volume
v/v	volume/volume
W	watt
W.	West, Western, etc.
WHO	World Health Organization
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wk	week
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CFTRI Mysore — 570 013, India.

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lbf	pound-force
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p.p.m.	parts per million
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PVDC	polyvinylidene chloride
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s.e.	standard error
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sp.gr.	specific gravity
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Suppl.	Supplement
t	metric tonne
temp.	temperature
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TS	total solids
UHT	ultra-high temperature
UV	ultraviolet
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| Acta Alimentaria Polonica | Canadian Journal of Animal Science |
| Agricultural Engineering | (English/French) |
| Agricultural Situation in India | Canadian Journal of Microbiology |
| American Journal of Botany | (English and French) |
| American Journal of Enology and Viticulture | Cereal Chemistry |
| American Scientist | Cereal Foods World |
| Anales de Bromatologia(Spanish) | Chemical Age of India |
| Analyst (London) | Chemical Senses |
| Andhra Agricultural Journal | Chemie Mikrobiologie Technologie der Lebensmittel (German) |
| Annals of Botany | Chemistry and Industry |
| Annals of Tropical Research | Coffee International |
| Applied and Environmental Microbiology | Confectionery Production |
| Applied Microbiology and Biotechnology | Confructa(German) |
| Appropriate Technology | CRC Critical Reviews in Analytical Chemistry |
| Archives of Environmental Contamination and Toxicology | CRC Critical Reviews in Biotechnology |
| Archivos Latinoamericanos de Nutricion | CRC Critical Reviews in Environmental Control |
| Archives of Toxicology | CRC Critical Reviews in Food Science and Nutrition |
| Arogya | CRC Critical Reviews in Microbiology |
| ASEAN Food Journal | CRC Critical Reviews in Toxicology |
| ASHRAE Journal | CSIRO Food Research Quarterly |
| Australian Journal of Agricultural Research | Cuban Journal of Agricultural Science |
| Australian Journal of Dairy Technology | Current Research |
| Australian Journal of Plant Physiology | Current Science |
| Baker's Digest | Dairy and Food Sanitation |
| Baking Today | Defence Science Journal |
| Bangladesh Journal of Scientific and Industrial Research | Deutsche Lebensmittel-Rundschau (German) |
| Baroda Journal of Nutrition | Ecology of Food and Nutrition |
| Bioscience | Economic Botany |
| Biotechnology and Bioengineering | Energy Digest |
| Brewer's Digest | Environmental Health |
| British Food Journal | Ernährungsforschung (German) |
| British Journal of Nutrition | Experimental Agriculture |
| British Poultry Science | Egyptian Journal of Food Science |
| Bulletin of Entomological Research | FAT Science Technology |
| Bulletin of Environmental Contamination and Toxicology | Fishery Technology |
| Bulletin of Grain Technology | Fluessiges Obst (German) |
| Bulletin of the Japanese Society of Scientific Fisheries (Nihon Suisan Gakkai-shi) | Food and Cookery Review |
| Bulletin of World Health Organization | Food and Chemical Toxicology |
| Bulletin of Sciences | Food and Nutrition, Notes and Reviews |
| Cafe-Cocoa-The | Food and Nutrition Bulletin |
| Cajanus | Food Chemistry |
| Canadian Entomologist | Food Drug Cosmetic Law Journal |
| Canadian Institute of Food Science and Technology Journal | Food Engineering International |
| | Food |
| | Food from Poland |
| | Food in Canada |
| | Food Irradiation Information |

Food Manufacture
 Food Microbiology
 Food Microstructure
 Food Processing Industry
 Food Product Development
 Food Production/Management
 Food Research Institute Studies
 (USA)
 Food Reviews International
 Food Science + Technology (English,
 French and German)
 Food Technology
 Food Technology in Australia
 Food Technology in New Zealand
 Food Trade Review
 Fruits

Getreide-Mehl und Brot (German)
 Gordian

Hortscience

IFST Proceedings
 Indian Arecanut, Spices and Cocoa
 Journal
 Indian Baker
 Indian Cashew Journal
 Indian Coconut Journal
 Indian Coffee
 Indian Dairyman
 Indian Farming
 Indian Food Industry
 Indian Food Packer
 Indian Horticulture
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 Indian Seafoods

Indian Spices
 Indian Sugar
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 Industries Alimentaires et
 Agricoles (French)
 Industries Agro-Alimentaires
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 Insect Science and Its Application
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 International Fruit World
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 Microbiology
 International Journal of
 Refrigeration
 International Journal for
 Vitamin and Nutrition Research
 International Pest Control
 International Sugar Journal
 Invention Intelligence
 Irish Journal of Food Science and
 Technology
 ISI Bulletin
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 JARQ (Japan Agricultural Research
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 Journal of the Institution of Chemist's (India)
 Journal of the Japanese Society for Food Science and Technology (Japanese) (Nippon Shokuhin Kogyo Gakkaishi)
 Journal of the Japanese Society of Starch Science (Japanese)
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 Journal of the Society of Dairy Technology

 Kenya Coffee
 Khadigramodyog

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Milling Feed and Fertiliser
 Milling & Baking News
 Mushroom Information
 Mushroom Journal
 Mysore Journal of Agricultural Sciences

 Nahrung (German)
 Nature
 Netherlands Milk and Dairy Journal
 New Scientist
 New York's Food and Life Sciences
 New Zealand Journal of Dairy Science and Technology
 Nutrition Reports International
 Nutrition Reviews

 Oils and Oilseeds Journal
 Oleagineux (French)

 Packaging
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 Pakistan Journal of Scientific and Industrial Research
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 Peanut Journal of Nut World
 Peanut Science
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 Poultry Tribune
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 Proceedings of the Indian Academy of Science, Section A
 Proceedings of the Indian Academy of Science, Section B
 Proceedings of the Nutrition Society of India
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Science
Progressive Horticulture
Punjab Horticultural Journal

Qualitas Plantarum
Quick Frozen Foods
Quick Frozen Foods International

Report of the National Food
Research Institute (Japan)
Research and Industry
Revista de Agroquimica Y
Tecnologia de Alimentos (Spanish)
Rice Journal
Riechstoffe Aromen Kosmetika
(German)

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Science Reporter
Sciences
Sciences Des Aliments
(French/English)
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Scientific World
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Seeds and Farms
Seed Science and Technology
Solar Energy
Soy bean Digest
Starch/Starke (German)
Swedish Journal of Agricultural
Research

Tea and Coffee Trade Journal
Technical Quarterly
Technology Review
Toxicology
Tropical Agriculture
Tropical Grain Legume Bulletin
Tropical Pest Management
Tropical Stored Products
Information
Two and a bud

VarFoda (Swedish)
Voeding (English/French/German)

World Coffee and Tea
World Crops
World Health
World's Poultry Science Journal

Zeitschrift Fuer
Lebensmittel-Untersch und
Forschung (German)

GENERAL

- 1 Forster (L), Teichardt (R) and Roth (D). Examinations about the aptitude of effluents of the food production for the application in plant production. *Lebensmittelindustrie* 34(2); 1987; 56-58 (De).

Effluents from sugar refineries, dairies, potato processing and potato starch factories were tested for the substitution of clear water in plant growth. Effluents can be used without additional restraints on application. Effluents of potato processing and potato starch factories can be used limitedly due to their high content of K and N. BV

- 2 Premavalli (KS), Vidyasagar (K) and Arya (SS). Studies on traditional Indian foods. II. Development and storage stability of upma mix. *Indian Food Packer* 41(4); 1987; 23-30

The role of packaging and fat on the storage stability of the upma (a savoury product from wheat semolina and vegetables) mix which could be reconstituted within 6 min with boiling water has been investigated. In paper Al foil (20 μ) polyethylene (30 μ) laminate and polypropylene pouches, (4 in x 3 in) the upma mix remained stable at room temp. (15-34.4 C) for 10 and 3 months resp. Vanaspati provided better stability in processing than that of RBD palm oil. Changes in peroxide value, free fatty acids and malonaldehyde content taking place during storage did not correlate with acceptability scores. Fatty acid composition also did not change significantly during storage. VKR

FOOD PROCESSING

- 3 Bray (F). Chilled foods. *Industrie Alimentari* 98(4); 1987; 365-368 (It).
- 4 Lokendra Singh, Mohan (MS) and Sankaran (R). Lowering of thermal processing requirements of an Indian dish by using nisin. *Indian Food Packer* 41(4); 1987; 31-36

Two groups of Kabuli channa curry filled in cans, steam exhausted and thermally processed were inoculated with spores of *Bacillus stearothermophilus* at levels of 2×10^5 and 5×10^5 g and added with nisin (dissolved in 4.0 pH water) 25, 50 and 75 IU/g and processed at 2.0, 3.0 and 4.0 processing value (F_0). Processed cans were incubated at 55 C for 6 days. Addition of 27-75 IU of nisin/g reduced the number of microbes from 420 to 755/g and 835 to 1655/g from the initial spore concn. of 2×10^5 and 5×10^5 g resp. Incubation of processed cans further reduced the number of surviving spores in nisin containing food. The level of 25 IU nisin/g with 2.0 F_0 is sufficient for satisfactory shelf life of the Kabuli channa. The nisin added cans showed better texture, taste and flavour and good storage life. KAR

Preservation

- 5 Anon. The new methods of preservation. *Food Manufacture* 62(7); 1987; 53-56

Describes in detail gas flush packaging, aseptic processing and irradiation as methods of preservation. BV

FOOD PACKAGING

Packaging materials

Plastic films

- 6 Wille (G) and Kraus (A). Metallized plastic films for packaging of foodstuffs. *Lebensmittelindustrie* 34(2); 1987; 62-63 (De).

Considers the advantages of metallized packaging materials in order to prepare their application in various types of food industry. BV

Tinplate

- 7 Thakur (SK), Banerjee (PK) and Kumaraswamy (C). The status of electrolytic tinplate and tin free steel industry in India. *Indian Food Packer* 41(4); 1987; 61-66

This general article deals with: installed capacity of tin plate/tin free steel in India; production trend; government policy, quality of tin free and tin plate produced by the industry in India. VKR

FOOD ENGINEERING AND EQUIPMENT

Engineering

- 8 Kroll (U), Rodicker (H) and Held (W-H). About the application of the permeative separation of gaseous mixtures under normal pressure. *Lebensmittelindustrie* 34(2); 1987; 83-85 (De).

Permeative separations of gaseous mixture are generally designated by application of high transmembrane pressure gradients. In special cases a permanent transmembrane mass transfer is possible without application of pressure. It is shown, that the maintenance of an optimum storehouse climate for long time storage for apples is possible at normal pressure with permeators made of silicon rubber hollow fibres. A model calculation of the exchange behaviour and the area adaption is carried out, for a storehouse with a capacity of 300 tons. AS

- 9 Nishinari (K). Physical properties of Food. Part II. *Journal of Japanese Society of Food Science and Technology* ' (Nippon Shokuhin Kogyo Gakkaishi') 34(1); 1987; 61 (Ja).

ENERGY IN FOOD PROCESSING

- 10 Spranger (M) and Link (R). Boiling under pressure or in the vessel - Comparison of the energy-economic efficiency. *Lebensmittelindustrie* 34(2); 1987; 59-61 (De).

Reports about the pressure boiling devices for industrial kitchens. The efficiency of the device is discussed. BV

Solar cooker

- 11 Mullick SC), Kandpal (TC) and Saxena (AK). Thermal test procedure for box-type solar cookers. *Solar Energy* 39(4); 1987; 353-360

Guidelines are given for thermal evaluation of box-type solar cookers, suitable for the boiling type of cooking. Suitable thermal tests have been proposed and appropriate parameters identified, which pertain to the solar cooker and are relatively independent of the climatic variables as well as the products cooked. BV

FOOD CHEMISTRY AND ANALYSIS

- 12 Hach (CC), Bowden (BK), Kopelove (AB) and Brayton (SV). More powerful peroxide Kjeldahl digestion method. *Journal of the Association of Official Analytical Chemists* 70(5); 1987; 783-787

Enhanced ammonia recovery and a simplified method are described for a rapid Kjeldahl digestion using sulphuric acid and hydrogen peroxide as the sole digestion reagents. The method reduces digestion time by 25-50% over the open-manifold peroxy method. A digestibility index (DI), scaled 0-10, establishes the difficulty of digestion for each sample and assigns value to compounds. Digested samples obtained by the method are suitable for direct colorimetric analysis of many elements in addition to Kjeldahl nitrogen. No distillation of the digested samples is required. MVB

Chemistry (Analytical)

- 13 Bui (LV) and Cooper (C). Reverse-phase liquid chromatographic determination of benzoic and sorbic acids in foods. *Journal of the Association of Official Analytical Chemists* 70(5); 1987; 892-896

An isocratic liquid chromatographic (LC) technique is described for the detn. of benzoic acid and sorbic acid in foods such as beverages, fruits, seafoods, vegetables, sauces, and dairy, bakery, and confectionery products. A C_{18} column is used with methanol-phosphate buffer (5+95) as mobile phase and 4-hydroxyacetanilide or 3, 5-dinitrobenzoic acid as internal standard. Sample preparation is simple, rapid, and produces a sample extract that has a min. effect on the column performance and life. Specificity of the method was checked against common food additives such as L-ascorbic acid, caffeine, artificial sweeteners (saccharin, cyclamate, aspartame), antioxidants (BHT, BHA) and artificial colours. Also described are 2 procedures for confirmation of the preservatives, using either redox reaction of sorbic acid with potassium permanganate or gas chromatography/mass spectrometry. Mean recoveries of 90-105% were obtained with a precision of 1-6% and a detection limit of 20 mg/kg for the 2 preservatives. AS

- 14 Bui (MH). Samples preparation and liquid chromatographic determination of vitamin D in food products. *Journal of the Association of Official Analytical Chemists* 70(5); 1987; 802-805

Sample preparation is described for fortified skim milk, infant formulas and diet food. The procedure involves 2 main steps: saponification of the sample followed by extraction and quantification by LC analysis. Depending on the sample matrix, addition as steps are necessary, namely, enzymatic digestion for hydrolysing the starch in the sample and cartridge purification before LC injection. Recovery of vitamin D added to unfortified skim milk is 98%. Result of detn. added to unfortified homogenised skim milk, fortified milk powder, fortified milk powder with soybean, chocolate drink powder, and sports diet are discussed. MVG

- 15 Cerklewski (FL) and Ridlington (JW). Chloride determination in foods with ion-selective electrode after isolation as hydrogen chloride. *Journal of the Association of Official Analytical Chemists* 70(5); 1987; 924-926

- 16 Stijve (T) and Hischenhuber (C). Simplified detn. of benzo(a)pyrene and other polycyclic aromatic hydrocarbons in various food materials by HPLC and TLC. *Deutsche Lebensmittel-Rundschau* 83(9); 1987; 276-282

Describes a simplified method for detn. of 12 significant polycyclic aromatic hydrocarbons (PAHs) in various commodities (smoked meats, fish, vegetable oils, coffee, coffee extract, tea, herbs, spices and spice oleoresins). Results obtained indicated recoveries of added PAHs at levels of 2.5-75 mcg/kg to various substrates ranged from 82-103% in some spice oleoresins and vegetable oils high levels of PAHs were present. BV

FOOD MICROBIOLOGY AND HYGIENE

Enzymes

Myrosinases

- 17 Palmieri (S), Iori (R) and Leoni (D). Comparison of methods for determining myrosinase activity. *Journal of Agricultural and Food Chemistry* 35(4); 1987; 617-621

Fermented products

Vinegars

- 18 Gonzalez (AMT) and Guzman Chozas (M). Acetoin content of Andalusian vinegars. *Sciences des Aliments* 7(3); 1987; 499-505 (Fr).

A study of the acetoin content of sixteen Andalusian vinegars was undertaken. The analyses were performed following the gravimetric method stated as official in Spanish regulations: oxidation to diacetyl and formation of a red Ni(II)-dimethylglyoximate precipitate. The results show a relevant content in acetoin, especially for those vinegars coming from wines treated under flor yeasts (Jerez aged vinegars). No relevant relation between total acidity and acetoin content has been found. AS

Microorganisms

Algae

- 19 Divakaran (S) and Duerr (EO). Characteristics of a blue-green alga (*Spirulina platensis*) preserved by acidulation with sulfuric acid. *Journal of Agricultural and Food Chemistry* 35(4); 1987; 568-570

The experiments on the extraction of fat from *Spirulina* by Soxhlet method after various drying techniques showed that the drying method did not influence the recovery of extractable fats which ranged from 6-8% on dry basis. It is also seen that acidulation and sun drying result in a dry spirulina end product of higher protein nutritional quality. Acidulation helps stage at room temp. avoiding refrigeration costs and also permits extended period of time required for sun-drying without spoilage. Vacuum drying is found to be an alternative method to sun-drying. NGKR

Bacteria

- 20 Buchman (GWIII) and Hansen (JN). Modification of membrane sulphydryl groups in bacteriostatic action of nitrite. *Applied and Environmental Microbiology* 53(1); 1987; 79-82

The mechanism by which the outgrowing spores of *Bacillus cereus* is inhibited by nitrite was studied. Results show that this was due to the fact that nitrite acts as a membrane directed sulphydryl agent. The mechanism by which nitrite modifies the reactivity of the sulphydryl groups could be either covalent modification or inactivation through communication with another modified membrane component. pH profiles suggest that the active agent was the protonated form of nitrite. The nitrite concn. which modifies membrane sulphydryl activity coincide with those which have a bacteriostatic effect. These results are consistent with membrane sulphydryl modification as components of nitrite increased bacteriostasis in this aerobic sporeformer. MVG

Aeromonas

- 21 Callister (SM) and Agger (WA). Enumeration and characterization of *Aeromonas hydrophila* and *Aeromonas caviae* isolated from grocery store produce. *Applied and Environmental Microbiology* 53(2); 1987; 249-253

Starch-ampicillin agar was used to quantitatively isolate *Aeromonas* sp. from retail grocery store produce. All produce sampled, including parsley, spinach, celery, alfalfa sprouts, broccoli, and lettuce, contained *Aeromonas* sp. In most instances, the count of *Aeromonas* sp. increased 10 to 1000-fold during 2 wk of storage at 5°C. Eleven (92%) of 12 kinds of produce yield cytotoxic *Aeromonas* sp. Identification as *Aeromonas hydrophila* was the strongest indicator of cytotoxicity, and all 29(100%) *A. hydrophila* isolates and 1 (6%) of 16 *A. caviae* isolates were cytotoxic. Twenty-seven (90%) of 30 cytotoxic *Aeromonas* sp. strains produced hemolysine. Strong correlations were also noted between ability to produce cytotoxin and positive Voges-Proskauer, lysine decarboxylase, and sorbitol fermentation reactions. It appears that grocery store produce is a potentially significant source of cytotoxic *Aeromonas* sp. and should be considered in the epidemiology of *A. hydrophila* gastroenteritis. AS

Bacillus stearothermophilus

- 22 Feeherry (FE), Munsey (DT) and Rowley (DB). Thermal inactivation and injury of *Bacillus stearothermophilus* spores. *Applied and Environmental Microbiology* 53(2); 1987; 365-370

A thermal resistance of *B. stearothermophilus* spores, the extent of the injured spore populations at various processing temp. and the significance of the injured spore population of low acid canned foods were studied. MVG

Clostridium botulinum

- 23 Dymicky (M), Bencivengo (M), Buchanan (RL) and Smith (JL). Inhibition of *Clostridium botulinum* 62A by fumarates and maleates and relationship of activity to some physicochemical constants. *Applied and Environmental Microbiology* 53(1); 1987; 110-113

A series of n-monoalkyl maleates and n-mono-, di-, and methyl n-alkyl fumarates were prepared, 18 esters of each, with $R = C_{18}/H_{37}$. Their activity against *Clostridium botulinum* was determined in culture medium. The n-monoalkyl maleates and fumarates possessed significant activity, particularly those esterified with higher C_{13} to C_{18} alcohols. Somewhat lower activity was exhibited by methyl-n-alkyl fumarates, while symmetrical esters, di-n-alkyl fumarates, were also most inactive. An attempt was made to correlate the activity of n-monoalkyl maleates and fumarates with chain length, solubility in water, apparent dissociation constant (pK_a), and infrared and UV absorption frequencies. The active esters may have potential as preservatives in foods. AS

Staphylococcus aureus

- 24 Tuncan (EU) and Martin (SE). Lysostaphin lysis procedure for detection of *Staphylococcus aureus* by the firefly bioluminescent ATP method. *Applied and Environmental Microbiology* 53(1); 1987; 88-91

The potential use of a lysostaphin lysis procedure for extraction of the ATP of *S. aureus* cells and use of a rapid bioluminescence firefly method for estimation of *S. aureus* were evaluated. Results showed that lysostaphin (22 μ /ml) was able to lyse most of *S. aureus* cells at room temp. in 1 unite. ATP extracted by this procedure was stable for 24 h in the presence of EDTA. There was a linear relationship between ATP content and the number of *S. aureus* cells. The procedure allowed for estimation of the number of *S. aureus* cells in mixed cultures and meat samples. MVG

Streptococcus cremoris

- 25 Hugenholtz (J), Splint (R), Konings (WN) and Veldkamp (H). Selection of protease-positive and protease-negative variants of *Streptococcus cremoris*. *Applied and Environmental Microbiology* 53(2); 1987; 309-314

The practical implication of the pH effect by using *S. cremoris* and several growth media, including milk were studied with condition that would select Prt+ variants in batch cultures and continuous cultures. It was suggested that independant selection for Prt+ and Prt- variants were common phenomon in *S. cremoris*, although it was dependant on the composition of the growth media. The Prt+ variants also had a selective advantage in continuous cultures under amino acid limitation and in growth media with low concn. of casein as a nitrogen sources.

MVG

- 26 Hugenholtz (J), Veldkamp (H) and Konings (WN). Detection of specific strains and variants of *Streptococcus cremoris* in mixed cultures by immunofluorescence. *Applied and Environmental Microbiology* 53(1); 1987; 149-155

A method to recognise *S. cremoris* in mixed cultures which is based on immunofluorescence techniques has been reported. MVG

Streptococcus lactis

- 27 Renault (PP) and Heslot (H). Selection of *Streptococcus lactis* mutants defective in malolactic fermentation. *Applied and Environmental Microbiology* 53(2); 1987; 320-324

An enrichment medium and a new sensitive medium were developed to detect malolactic variants in different strains of lactic bacteria. Factors such as the conc. of glucose and L-malate, pH level, and the type of indicator dye used are discussed with regard to the kinetics of malic acid conversion to lactic acid. Use of these media allowed a rapid and easier screening of mutagenized streptococcal cells unable to ferment L-malate. A collection of malolactic-negative mutants of *Streptococcus lactis* induced by UV, nitrosoguanidine, or transposonal mutagenesis were characterized. The results showed that several of the mutants were apparently defective in the structural gene of malolactic enzyme where as others contained mutations which may either inactivate a putative permease or affect a regulatory sequences. AS

Fungi

Mushrooms

- 28 Kazuno (C), Nishijima (M), Amakawa (E), Sakai (S) and Kamoi (I). Determination of organic acids in edible mushrooms by high performance liquid chromatography. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi') 34(1); 1987; 42-47 (Ja).

A high performance liquid chromatographic method (HPLC) was developed for the detn. of organic acids (oxalic, tartaric, formic, Alpha-ketoglutaric, lactic, acetic, citric, pyroglutamic, succinic and fumaric) in edible mushrooms. Organic acids were extracted with hot water. The solution was applied to a DEAE-sephadex A-25 column (borate type 20 mm i.d. x 50 mm). The column was washed with 100 ml of water, and organic acids were eluted with 0.1 N hydrochloric acid. Organic acids were separated by HPLC on a column packed with KC-811 (8 mm i.d. x 300 mm) by using 0.1% phosphoric acid solution as a mobile phase, and on a column packed with ULTRON-C18 (4.6 mm i. d. x 50 mm) by using 0.1 M potassium phosphate, monobasic solution (pH 2.2) as a mobile phase which detects at 210 nm. The recoveries of organic acids on DEAE column chromatography at levels of 75 to 1000 µ were in the range from 80% to 110%. By using this method six commercial samples were analyzed. Eleven kinds of organic acids were identified. There were remarkable differences in the distribution patterns of organic acid comp. among the different species of edible mushrooms. AS

Rhizopus arrhizus

- 29 Touraine (F) and Drapron (R). Activity of lipase from *Rhizopus arrhizus* in water-glycerol and water-glycol media. *Sciences des Aliments* 7(3); 1987; 411-431 (Fr).

The influence of water activity pH, and temp. on activity of lipase (EC 3.1.1.3) from *Rhizopus arrhizus* was studied in different water-alcohol mixture. Glycerol, ethylene glycol, diethylene glycol and propylene glycol were used as lowering agents of water activity. The lipase activity was shown to be significantly reduced when water activity was lowered, the decrease depending also on the kind of alcohol used depress water activity. In relation with the deviation of water-alcohol mixture from Raoult's law, the enzyme activities seemed to be in correlation with the water activity instead of the nature of the alcohol. The lowering effect of water activity on Michaelis constant was most pronounced in the range 0.8-0.9 and the apparent K_m was reduced by 50% for diols and 80% for glycerol. The temp. and pH optima for lipase activity depended essentially on the kind of alcohol employed. For a decrease of water activity from 1.0 to 0.65, glycerol led to an increase of about 0.5 unit for optimum pH, while glycols had the reverse effect (decrease of 0.5 unit with ethylene glycol and diethylene glycol and 1.5 unit with propylene glycol.) The optimum temp. decreased from 37 °C to 20 °C in the presence of propylene glycol at 0.74 water activity and increased from 37 °C to 50 °C in the presence of glycerol at 0.63 water activity. However, no significant modification was observed with ethylene glycol and diethylene glycol. KAR

Yeasts

- 30 Juroszek (J-R), Feuillat (M) and Charpentier (C). Effect of the champagne method of starter preparation on ethanol tolerance of yeast. *American Journal of Enology and Viticulture* 38(3); 1987; 194-198
- 31 Raherimandimby (M) and Goma (G). Comparative study of alcoholic fermentation of corn hydrolysate and beet molasse by a flocculent yeast system. *Sciences des Aliments* 7(3); 1987; 507-517

The alcoholic fermentation of corn hydrolysate by the flocculent yeast *Saccharomyces cerevisiae* NRRL Y 265 showed blocked cell metabolism and fermentation activity in batch cultures. On beet molasses however this inhibition was not observed. This is probably due to an insufficient source of nitrogen in the conventional medium. In continuous cultures on corn hydrolysate, the performance of the system was limited by the critical fermentation rate. $D.S_0 = 40$ g/L.h and the substrate concn. $S_0 = 200$ g/L. On beet molasses the same critical substrate flux $D.S_0 = 40$ g/L.h was observed by the substrate concn. was limited by $S_0 = 140$ g/L. Above these value, the system became unstable: the flocculation of yeast was disturbed. An optimization was needed. AS

Saccharomyces cerevisiae

- 32 Cassio (F), Leao (C) and Van Uden (N). Transport of lactate and other short-chain monocarboxylates in the yeast *Saccharomyces cerevisiae*. *Applied and Environmental Microbiology* 53(3); 1987; 509-513

Membrane transport of lactic acid and other monocarboxylic acids in a strain of yeast *Saccharomyces cerevisiae* has been studied. MVB

- 33 Parker (C) and DiBiasio (D). Effect of growth rate and expression level on plasmid stability in *Saccharomyces cerevisiae*. *Biotechnology and Bioengineering* 29(2); 1987; 215-221

The stability of the recombinant system used (2- μ -based plasmid) could be improved at high dilution rates, and that increased

plasmid expression levels resulted in decreased stability. The likely explanations related to the measurement made are discussed. MVB

- 34 Walker-Caprioglio (HM) and Parks (LW). Autoconditioning factor relieves ethanol-induced growth inhibition of *Saccharomyces cerevisiae*. *Applied and Environmental Microbiology* 53(1); 1987; 33-35

Viable *Saccharomyces cerevisiae* suspended in medium containing growth inhibiting concn. of ethanol produce a metabolite that relieves growth inhibition. This autoconditioning of the medium by yeasts is due to the formation of small amounts (0.01%, vol/vol) of acetaldehyde. The effect is duplicated precisely in fresh medium by the addition of acetaldehyde. Acetaldehyde does not increase the yield of or accelerate ethanol production by the organism. Ethanol-induced modifications of membrane order in the plasma membranes, as measured by steady state fluorescence anisotropy of 1, 6-diphenyl -1, 3, 5-hexatriene, were not resolved by exogenously added acetaldehyde. AS

Hygiene

Vibrio cholerae

- 35 Amako (K), Shimodori (S), Imoto (T), Miake (S) and Umeda (A). Effects of chitin and its soluble derivatives on survival of *Vibrio cholerae* 01 at low temperature. *Applied and Environmental Microbiology* 53(3); 1987; 603-605

BIOTECHNOLOGY

- 36 Cantarelli (C). Research and training in food biotechnologies. *Industria Alimentari* 26(4); 1987; 333-348 (It).

TISSUE CULTURE

Nil

FOOD ADDITIVES

Emulsifiers

- 37 Madsen (J). Emulsifiers used in margarine, low calorie spread, shortening, bakery compound and filling. *FAT Science and Technology* 89(4); 1987; 165-172

Emulsifiers used in the food industry improve texture, stability, volume, softness, aeration, homogenization and shelf life. By reducing interfacial tension between oil and water they facilitate the formation of emulsions. Stabilization of low calorie spread emulsions and use of the right emulsifier is very important for achieving a stable spread. The influence of emulsifiers on quality in cake and puff pastry margarine and the prevention of sandiness in margarine are illustrated. In bakery compound used for yeasted white bread and filling containing sugar syrup emulsifiers give improved stability. KAR

Flavourings

- 38 Bramwell (A). The role of flavourings in the food supply-benefits and some pitfalls. *Chemistry and Industry* (11); 1987; 380-385

This paper describes the important role played by flavouring in the food supply and identify the benefits and pitfalls resulting from their use especially during the period of fluctuation and change. Balanced diet, pleasure in eating, choice, rationale for flavour use (blandness of staple foods, palatability, supply problems, missing flavour, product differentiation, new foods, hygiene safety, technological rationale, cost, dietary rationales) risks/benefits (Polycyclic aromatic hydrocarbons, nitrosamines, cyanogenic glycosides) pitfalls for the flavour industry/consumer (monosodium glutamate, common salt, compound ingredients) and development, challenges for the flavour industry are discussed. BV

CEREALS

- 39 Buck (JS), Walker (CE) and Watson (KS). Incorporation of corn gluten meal and soy into various cereal-based foods and resulting product functional, sensory and protein quality. *Cereal Chemistry* 64(4); 1987; 264-269

- 40 Kadan (RS) and Ziegler (GMJr). Changes in iron forms during extrusion processing. *Cereal Chemistry* 64(4); 1987; 256-259

Results of changes in iron forms in a typical extruded cereal based food and under simulated stomach digestion conditions, are reported. MVG

- 41 Scott (FM) and Lawrence (GA). Liquid chromatographic determination and stability of the *Fusarium* mycotoxin moniliformin in cereal grains. *Journal of the Association of Official Analytical Chemists* 70(5); 1987; 850-853

A LC method is described for detecting moniliformin in corn and wheat. In addition, a limited survey of Canadian grains for moniliformin and a study of toxin stability in ground corn and wheat at different temp. are discussed. MVG

Barley

- 42 Anon.. Application of biotechnology to barley research Theme of 1987 Barley improvement conference. *Brewers' Digest* 62(8); 1987; 41-42

Contains abstracts of 11 papers presented at the "Application of Biotechnology to Barley Research" conference sponsored by the American Malting Barley Association, Jan 7, 1987, Minneapolis, MN. BV

- 43 Bach Knudsen (KE), Eggum (BO) and Jacobsen (I). Nutritive value of Danish-grown barley varieties. II. Effect of carbohydrate composition on digestibility of energy and protein. *Journal of Cereal Science* 6(2); 1987; 187-195

The present investigation was carried out to study the nutritive value of barley in relation to type of barley var. yr and locality. After dividing the barley samples into 3 groups the digestible energy, true protein digestibility, biological value and net protein utilis-

ation were determined in rats. Results showed that more detailed carbohydrate analyses should be included in the analytical scheme when estimating metabolisable energy and net energy of feed and foodstuff from chemical data. NGKR

- 44 Trucksess (MW), Flood (MT), Mossoba (MM) and Page (SW). High-performance thin-layer chromatographic determination of deoxynivalenol, fusarenon-X, and nivalenol in barley, corn and wheat. *Journal of Agricultural and Food Chemistry* 35(4); 1987; 445-448

A TLC method for the detn. of toxins deoxynivalenol, fusarenon-X, and nivalenol in barley, corn and wheat using acetonitrile-water-method for extraction, purification by lead acetate precipitation, filtration through alumina-charcoal celite column and separation on an octadecylsilane column. The blue fluorescent spots developed after heating were quantitated fluorodensitometrically. This method was tested and the identity of the three toxins was confirmed after trimethylsilyl derivative formation and gas chromatographic separation followed by matrix isolation/Fourier transform infrared spectrophotometric analysis with an average recovery at 83%. NGKR

Oats

Oat proteins

- 45 Goulet (G), Ponnampalam (R), Amiot (J), Roy (A) and Brisson (GJ). Nutritional value of acylated oat protein concentrates. *Journal of Agricultural and Food Chemistry* 35(4); 1987; 589-592

Protein extract from oat groats was acylated with acetic (0.031 and 0.092 g/g of protein) and succinic (0.031 and 0.110 g/g protein) anhydrides to produce acetyl protein conc.(APC) and succinyl protein conc. (SPC), resp. With both the acylating agents, approx. 36 (APC-37, SPC-35) and 76% (APC-76, SPC-76) of the Epsilon-amino groups of lysine were acylated. The nutritive value of acylated protein conc. was compared with that of the untreated oat protein conc.(UOPC). The amino acid composition of the conc. was not altered by acylation. The PER values of APC-37 and APC-76 were 84% and 47% that of UOPC, whereas the PER values of SPC-35 and SPC-76 were only 62% and 0% that of UOPC. The apparent digestibility coeff.(ADC) on nitrogen of APC-76, SPC-35, and SPC-76 were significantly ($P < 0.05$) increased when compared to UOPC. Supplementation of SPC-76 with L-lysine hydrochloride to compensate for the amount succinylated gave a PER corresponding to 82% that of UOPC. The blend (1:1 ratio on protein basis) of SPC-76 and whey protein conc. gave a PER greater than that of UOPC. AS

- 46 Ma (C-Y) and Harwalkar (VR). Thermal coagulation of oat globulin. *Cereal Chemistry* 64(4); 1987; 212-218

Association/dissociation of oat globulin upon heat treatment and the mechanism of thermal coagulation were studied. Similarities and differences in heat aggregation of oat globulin and soy glycinins are discussed. Results suggest a significant difference in heat coagulation of oat globulin and soy glycinin, although the two proteins have similar molecular structures. MVG

Paddy

- 47 Joshi (BC), Srivastava (SK) and Prajapati (SK). Studies on direction of mycoflora and mycotoxins in paddy harvested from rain affected crop in Haryana. *Bulletin of Grain Technology* 25(2); 1987; 188-190

The impact of untimely rains on the mycoflora and mycotoxin contamination in paddy grains was studied. Samples were collected from procurement centres/grain mandies and moisture was determined using universal moisture meter. Mycoflora was isolated by Blotter test method and aflatoxin contamination estimated by Pons et al method. Results showed that field fungi were dominant and storage fungi has established predominant position and a few samples contained aflatoxin B1. NGKR

- 48 Krishna Rao (V), Ratna Sudhakar (T), Sreerama Murthy (K) and Narayana Rao (PV). Effect of certain chemicals in preventing the spoilage of wet paddy during inclement weather. *Bulletin of Grain Technology* 25(2); 1987; 169-175

In order to prevent spoilage of wet paddy due to rain soaking the effect of three chemicals viz. sodium chloride, calcium chloride, and potassium chloride, at three concn., 2.5, 5.0, and 10.0% along with 20% paddy husk powder as carrier material has been studied. As sun-drying is not possible due to inclement weather at the time of threshing of paddy it becomes rain soaked and subsequently spoiled. The results of the study of the above treatments showed that all the treatment completely prevented sprouting wet grain. The percentage of discoloured grains and percent incidence of fungal flora were significantly reduced by all the three chemicals. Among the chemicals used, sodium chloride at 2.5% w/w along with 20% paddy husk powder was found to be superior than other chemicals. NGKR

Rice

- 49 Ando (S), Doi (S), Terazono (K), Takayama (T) and Hanai (S). The effects of manufacturing processes on flavour of rice-shochu. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi') 34(1); 1987; 48-53 (Ja).

The effects of koji, yeasts and distillation methods on fragrance of rice-shochu were studied and evaluated by sensory tests. The components of fragrance of rice shochu were influenced by both koji and yeasts, especially, the distillates using sake-yeast contained much larger amount of n-propanol, iso-amyl acetate, ethyl caprylate and ethyl caprate than those using shochu yeast. According to sensory test, it was clear that the distillates by vacuum distillation was evaluated as better than the others. KAR

- 50 Chrastii (J) and Parrish (FW). Phospholipases C and D in rice grains. *Journal of Agricultural and Food Chemistry* 35(4); 1987; 624-627
- 51 Hayakawa (S), Suzuki (H) and Suzuki (T). Radial distribution of amino acids in the milled rice kernel. *Journal of Agricultural and Food Chemistry* 35(4); 1987; 607-610
- 52 Lookhart (GL), Albers (LD), Pomeranz (Y) and Webb (BD). Identification of U.S. rice cultivars by high-performance liquid chromatography *Cereal Chemistry* 64(4); 1987; 199-206

Twenty nine rice cvs including major commercial types were differentiated by reverse phase high performance (HPL) of prolamines. MVG

- 53 Tyagi (RFS), Singh (T) and Srivastava (SK). Studies on detection of mycoflora and aflatoxin B1 in rice under prolonged storage. *Bulletin of Grain Technology* 24(1); 1987; 58-63

70 samples of rice which were under storage for 4 to 8 yr. in

Central Ware Housing Corporation and Food Corporation of India depots and fumigated 8 to 28 times with Al. phosphide have been analysed for aflatoxin contamination. The results showed that only 10 samples were found to be contaminated with aflatoxin B1 in the range of traces to 20 p.p.b which is below the tolerance limit of 30 p.p.b. Out of the 50 samples analysed for mycoflora only 7 samples were found to be infected with different storage fungi. NGKR

Rice starch

- 54 Chungcharoen (A) and Lund (DB). Influence of solutes and water on rice starch gelatinization. *Cereal Chemistry* 64(4); 1987; 240-243

Gelatinization phenomena in rice flours and isolated starches from the Demont var. and a mixture of Nato and Mars var. were investigated using differential scanning calorimetry. When a flour or starch suspension in an excess amount of water was heated to 130 °C at 10 °C/min, gelatinization endotherm was observed at a temp. range of 65 - 86 °C. No difference was found between the gelatinization characteristics of flours and their isolated starch counterparts. In the presence of sucrose or sodium chloride, gelatinization temp. shifted to higher temp. and enthalpy associated with the endothermic process decreased. The extent of temp. shift and enthalpy change was dependent on the water-to-starch ratio. KAR

Wheat

- 55 Bach Knudsen (KE), Aman (P) and Eggum (BO). Nutritive value of Danish-grown barley varieties. I. carbohydrates and other major constituents. *Journal of Cereal Science* 6(2); 1987; 173-186

The reproducibility of analytical methods for low mol. wt. sugars, starch, soluble and insoluble dietary fibre (DF), non-starch polysaccharides (NSP) and Klason lignin was tested in 50 barley samples. The carbohydrate methods were highly reproducible with coeff. of variation varying from 0.6 to 3.9%. These samples were further analysed for soluble and insoluble Beta glucans. The materials used in this investigation included four spring feeding, three spring malting and two winter feeding barley var. grown in three different yr on a good quality clay soil and a poor quality sandy soil in Denmark. Starch content (% of dry matter) was 1.7% higher and DF was 2.1% lower in spring malting than in spring feeding var. The lower DF was accounted for by differences in both soluble and insoluble DF. In spring malting var. total Beta-glucan was 4.1% compared to 4.6 and 4.3%. In spring and winter feeding var. resp. The soluble Beta glucan fraction was, however, reduced relatively more than the insoluble fraction in malting var. The starch, DF and protein contents were strongly affected by both yr and locality. For barley var. grown on the poor quality sandy soil, starch content decreased from 60.3% in 1981, to 53.8% in 1983, while DF and protein content increased from 21.5 and 11.4% to 24.4% and 13.5%, resp. The strongest effect of yr and locality was identified in the spring var. AS

- 56 Fox (DJ), Walsh (T), Marsh (S) and Annuk (D). Glycosidases of wheat. *Journal of the Science of Food and Agriculture* 41(1); 1987; 93-96

This paper reports a range of glycosidase activities isolated from the mill fractions made from soft and hard grists. The distribution of glycosidase activities in the wheat kernel is indicated in this study. Glycosidase isolated from the mill fractions made from soft and hard wheat grists were studied in this connection. It was found that Alpha-arabinosidase, Alpha-galactosidase, Beta-

galactosidase, Beta-glucosidase, Beta-glucosidase, Beta-mannosidase and Beta-xylosidase activities in wheat flour, germ and bran when determined under standard conditions no significant differences between the level of activities from hard and soft grists were observed whereas it is generally highest in the germ and lowest in flour. NGKR

- 57 Legris-Delaporte (S) and Landry (J). The effect of foliar application of elemental sulphur on the accumulation of protein-incorporated amino acids in developing wheat grain. *Journal of Cereal Science* 6(2); 1987; 119-123

This study was carried out to determine the effect of foliar elemental sulphur on the accumulation of protein incorporated amino acids in developing wheat grain. Three foliar sprays of elemental sulphur on wheat caused a reduction in the rate of accumulation of protein and hence in protein amino acids in the grain at its development stage. Results showed that the relative accumulation rates of amino acids as evaluated by the slopes of regression lines relating to the levels of each protein amino acid and total protein was not altered. This has been compared with literature data. NGKR.

- 58 Neuman (M), Sapirstein (HD), Shwedyk (E) and Bushuk (W). Discrimination of wheat class and variety by digital image analysis of whole grain samples. *Journal of Cereal Science* 6(2); 1987; 125-132

This study was carried out to evaluate the possibility of objectively determined kernel characteristics to distinguish different wheat classes and var. This was done by the application of digital image analysis for objective classification of wheat cv according to kernel type and identity. Perfect classification was found possible for four durum wheat var. when mixed with ten common wheats. Likewise samples of each of five CWRS (Canada Western Red Spring) wheat var. were able to be distinguished. The discrimination of var. within classes was found to give correct classification scores ranging from 15 to 96%. NGKR

- 59 Scudamore (KA). Fumigant residues in wheat and other cereal grains resulting from the use of 1, 1, 1-trichloroethane and bromomethane as a liquid fumigant mixture. *Pesticide Science* 20(1): 1987; 1-18

- 60 Wu. (YV). Recovery of stillage soluble solids from hard and soft wheat by reverse osmosis and ultrafiltration. *Cereal Chemistry* 64(4); 1987; 260-264

Ultrafiltration combined with reverse osmosis (at 1,360 and 5,440 kPa) was used to process stillage solubles from hard and soft ground wheats and their flours as an economic alternative to drying. MVB

Wheat flour

- 61 Cherdkiatgumchai (P) and Grant (DR). The determination of ascorbic acid in wheat flour suspension by differential pulse polarography. *Cereal Chemistry* 64(4); 1987; 288-290

- 62 Okoli (EC), Ezenweke (LO) and Alaedu (A). Improvement by oxidising agents of the baking performance of pure and composite flours from Nigerian-grown wheats (Lee X and Inia 66). *Journal of the Science of Food and Agriculture* 41(1); 1987; 69-79

The feasibility of improving the bread-baking performance of two

var. of Nigerian grown wheat (Lee X and Inia 66) in pure and composite flour, using the oxidising agents potassium bromate and ascorbic acid was studied. Composite flour was prepared by mixing pre-cooked bambara bean (*Voandzeia subterranea*) flour at levels between 0 and 50% with each of commercial (control), Lee x and Inia 66 wheat flour. Physical and sensory evaluations showed that the performance of straight Lee x and Inia 66 flours was inferior to that of the commercial flour. The commercial flour showed better blending with bambara flour, producing acceptable loaves at up to 20% substitution with bean flour; Lee x and Inia 66 could not tolerate blending beyond 15 % and 5% levels, resp. Physical properties and baking performance of the Lee x and Inia 66 flours were improved by treatment with potassium bromate, ascorbic acid and potassium bromate /ascorbic acid combinations. Lee x flour was more responsive to the treatments than Inia 66. When treated with the optimal level of improver combination, Lee x flour performed as well as the commercial flour, and treated Lee x composite flours containing up to 30% pre-cooked bambara flour were found to produce loaves not significantly different from 100% commercial wheat bread ($P < -0.05$). AS

- 63 Toyoshima (H), Imai (T) and Shibata (S). Noodle (Udon) making quality of stream flour divided in laboratory mill. Report of the National Food Research Institute '(Shokuryo Kenkyusho Kenkyu Hokoku)' 62(3); 1987; 30-36 (Ja).

The samples of stream flour from the domestic wheat cvs (Norin 61) processing suitability for udon. The protein and ash contents and enzyme activity increases with the progress of milling, while the degree of whiteness decreased. Both the specific value of the Farinogram and the cooking time of the raw udon were well correlated with the protein content in the sample. Cooking loss of the udon was increased in proportion to the enzyme activity in the sample. The characteristics of protein in the stream flour significantly affected the extensogram and the tensile test of cooked udon. Among the tensile tests, the elongation ratio of cooked udon was found to be an indicator of the masticatory feeling. The extensogram of 4M and 5M flours in the latter part of reduction showed that the characteristics of protein in these samples were poor; nevertheless, the protein characteristics did not affect the masticatory feeling. The 4M and 5M flours were unsuitable for processing for udon due to their low degree of whiteness and increase in cooking loss. AS

Wheat protein

- 64 Iwami (K), Hattori (M) and Ibuki (F). Prominent antioxidant effect of wheat gliadin on linoleate peroxidation in powder model systems at high water activity. *Journal of Agricultural and Food Chemistry* 35(4); 1987; 628-631

A var. of proteins were examined for their antioxidant activities in powder model systems and the effectiveness of food proteins especially of gliadin at different water activities has been studied. When antioxidant effects of various food proteins were investigated by measuring changes in peroxide values and by gas chromatographic detn. of fatty acids gliadin has proved to be the most effective samples tested maize zein, ovalbumin and soy protein isolate followed it to a lesser extent. The antioxidant effect of gliadin was found to be closely related to the moisture content in the model system. NOKR

- 65 Iskander (FY), Morad (MM), Klein (DE) and Bauer (TL). Determination of protein and 11 elements in six milling fractions of two wheat varieties. *Cereal Chemistry* 64(4); 1987; 285-287

The concn. of Br, Ca, Cl, Fe, K, Mg, Mn, Na, Rb, Se, and Zn were measured in a hard red winter (Scout 66) and a soft red winter (Coker 762) wheat cv. using neutron activation analysis. The soft wheat had a higher concn. of Br, Cl, Fe, K, Mn, and Zn and a lower concn. of Ca. Depending on the particle size, the ground whole wheat was separated into six milling fractions labeled A (coarse) through F (fine). The highest concn. of Ca, K, Mn, Na, Rb, Se, and Zn were found in fractions A and B. Except for Br and Cl, both cv. showed positive correlations between the elements measured in the milling fractions. The in vitro protein digestibility for whole wheat was higher compared to that of fractions A and B, and lower compared to that of fractions C through F. AS

Wheat starch

- 66 Bjorck (I), Nyman (M), Pedersen (B), Siljestrom (M), Asp (N-G) and Eggum (BO). Formation of enzyme resistant starch during autoclaving of wheat starch: Studies in vitro and in vivo. *Journal of Cereal Science* 6(2); 1987; 159-172

In this study the formation of in vitro resistant starch during autoclaving and freeze drying of wheat starch suspension was evaluated. Results showed that a major portion of starch upto 8% (dry wt) was rendered resistant to enzymes during heat treatment unless treated with KOH while freeze drying did not have much effects. The in vivo digestibility of accessible starch was close to 100% whether Nebacitin was found to be present or not. It is found that autoclaving a process known to increase enzyme availability may significantly reduce the overall digestibility of starch. This may be of negative nutritional consequence if used to gelatinise starch for incorporation into baby food. However in adults an increase in unabsorbed starch may be nutritionally advantageous by increasing faecal bulk and providing the faecal flora with a readily available source of carbohydrates. NGKR

- 67 Russell (PL). The ageing of gels from starches of different amylose/amylopectin content studied by differential scanning calorimetry. *Journal of Cereal Science* 6(2); 1987; 147-158

Differential scanning calorimetry (DSC) has been used to study the ageing of gels made from starches with different amylopectin contents (at 57% moisture content, $V_1 = 0.67$). All the gels exhibited development of a 'staling endotherm' S over a similar temp. range. The data were analysed by fitting an Avrami equation to each data set using the method of non-linear least squares. All the data sets were also analysed together employing different models, in which any or all of the Avrami parameters (limiting value A_L , rate constant K or Avrami exponent n) were made identical for each starch. DSC results fitted best a model with $n < 1$ however, the rankings of A_L and K were little affected by different models. Rate constants were unrelated to amylopectin content, identifying the S endotherm with reordering of the amylopectin. The results are consistent with the presence of amylopectin, amylose-lipid complexes and amylose in different domains within starch granules, as indicated by recent ultrastructural studies. Only weak coupling exists between phenomena occurring in different domains. DSC of ageing starch gels is sensitive to changes in the amylopectin domains: a comparison is made between DSC and some other physical techniques. AS

- 68 Seguchi (M). Effect of chlorination on the hydrophobicity of wheat starch. *Cereal Chemistry* 64(4); 1987; 281-282

Aqueous suspensions of wheat prime starch chlorinated at various levels and containing isoamyl alcohol were vigorously shaken, and the volume and stability of the bubbles formed were measured. Bubble volume and stability increased with chlorination rate. Microscope observation showed that chlorinated prime starch hydrophobically associated with isoamyl alcohol droplets, however, nonchlorinated prime starch did not. These observation showed the increased hydrobicity of the surface of wheat starch caused by the action of chlorine gas. AS

MILLETS

Bajra

- 69 Chauhan (BM), Neeraj Suneja) and Bhat (CM). Nutritional value and fatty acid compostion of some high yielding varieties of bajra. *Bulletin of Grain Technology* 24(1); 1987; 44-49

Eight high yielding var. of bajra seeds were analysed for minerals, phytate, tannins, thiamin, fatty acid composition and protein digestibility. The results showed that protein ranged from 10.5 to 14.8%; fat from 8.32. to 10.41%; crude fibre from 0.87 to 1.20%; ash from 1.59 to 1.91% and total available carbohydrates from 70.38 to 78.61%. The Ca, P, phytate P, Fe, Zn, Mn, phytate and thiamin varied from 52 to 62; 300 to 390; 167 to 293; 5.0 to 7.5; 1.2 to 2.1; 0.63 to 1.25; 594 to 1040; and 0.29 to 0.40 (mg/100 g) resp. Tannins were found to be absent. In vitro digestibility of protein ranged from 53 to 68%. Among the fatty acids, linoleic acid was found to be the major fatty acid followed by oleic, stearic, linoleic and palmitic acid. NGKR

Corn

- 70 Mukunda (MR), Malathi (P) and Potty (VH). Potential of maize and jowar as adjuncts in Indian breweries - a survey study. *Indian Food Packer* 41(4); 1987; 37-42

The findings of the pilot survey on the current level of use of maize and jowar as adjuncts in Indian breweries indicates that maize is used to some extent but jowar is not used. Scope for the use of maize and jowar as adjuncts in breweries has been pointed out. VKR

- 71 Porcher (JM), Lafarge-Frayssinet (C), Frayssinet (G), Nurie (A), Melcion (D) and Richard-Molard (D). Determination of cytotoxic trichothecenes in corn by cell culture toxicity assay. *Journal of the Association of Official Analytical Chemists* 70(5); 1987; 844-849
- 72 Serna-Saldivar (SO), Knabe (DA), Rooney (LW) and Tanksley (TDJr). Effects of lime cooking on energy and protein digestibilities of maize and sorghum. *Cereal Chemistry* 64(4); 1987; 247-252

The objectives of the study are: to determine the effect of lime cooking on the nutritional value of whole sorghum and maize; to determine the nutritional value of decorticated, lime cooked sorghum; and to compare the nutritional value of maize and sorghum in alkaline cooked foods. MVB

Corn meal

- 73 Harris (PL), Guppett (SL), Walker (CE) and Rupnow (JH). Lipid and colour evaluations of solvent-extracted maize gluten meal. *Cereal Chemistry* 64(4); 1987; 283-284

Wet-milled maize gluten meal was lyophilized, and the pigments and lipids were removed using a series of test solvents (acetone, acetonitrile, ethyl acetate, hexane, methanol, and petroleum ether) in a Soxhlet apparatus. Colour evaluation, measured by a Hunter colour difference meter and lipid detn. using an ethyl extraction procedure were performed on the resultant solvent-extracted maize gluten meal. Acetone extraction procedure was developed that removed most of the lipids and pigments and produced a residue similar in colour to defatted soy flour. AS

Corn proteins

- 74 Wall (JS) and Bietz (JA). Differences in corn endosperm proteins in developing seeds of normal and opaque-2 corn. *Cereal Chemistry* 64(4); 1987; 275-280

Corn syrup

- 75 Brooks (JR) and Griffin (VK). Saccharide analysis of corn syrup solids and maltodextrins using high-performance liquid chromatography. *Cereal Chemistry* 64(4); 1987; 253-255

Sorghum

- 76 Osagie (AU). Total lipids of sorghum grain. *Journal of Agricultural and Food Chemistry* 35(4); 1987; 601-604

The comparative studies of three solvent mixtures for the extraction of sorghum lipids have been carried out and results presented in this paper. The results showed that fatty acid composition of the total lipids was similar to all extraction procedures with linoleic acid (18:2) being the predominant fatty acid. NGKR

- 77 Reed (JD). Phenolics, fiber, and fiber digestibility in bird resistant and non bird resistant sorghum grain. *Journal of Agricultural and Food Chemistry* 35(4); 1987; 461-464

The relationships among soluble phenolics, soluble and insoluble procyanidins, fiber and fiber digestibility in sorghum grain have been studied. The differences between bird resistant and nonbird resistant sorghum grain in fibre and phenolic content were determined. The results indicated that the Vtterbium method for detn. and isolation of soluble phenolics is appropriate for use in sorghum grain because the quantity of phenolics precipitated is highly correlated with their reactivity to vanillin/HCl and the phenolics so isolated from bird resistant var. inhibit cellulase activity. NGKR

Sweet sorghum

- 78 Wu (YV). Recovery of protein-rich by-products from sweet sorghum grain stillage after alcohol distillation. *Cereal Chemistry* 64(4); 1987; 244-247

Ground sweet sorghum grain was fermented to ethanol, ethanol was distilled, and residual stillage were separated into distillers

grains, centrifuged solids, and stillage solubles. Distiller's grains and centrifuged solids had protein contents (N x 6.25, dry basis) of 42 and 46% resp., and accounted for 73 and 8% of total grain nitrogen. Distiller's grains protein was much less soluble than that of unfermented sweet sorghum grain. Seventy-two per cent of the nitrogen in stillage solubles passed through a 10,000 mol. wt. cut-off membrane. Combined ultrafiltration and high-pressure reverse osmosis effectively processed stillage solubles into a small volume of conc. with potential feed use and a large volume of permeate, which can be reused for water or safely discarded. AS

PULSES

Adzuki beans

- 79 Syozo Abe. A modification of the boiled beans for the raw ann manufacture of Adzuki. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi') 34(1); 1987; 14-19 (Ja).

As for the manufacturing Adzuki raw ann (unsweetened Adzuki bean jam), it is important to cook the beans in boiling water to be homogeneously soften well enough for mashing. Special care should be taken to prevent cracking of the swollen beans, which is responsible to the decreasing yield of the ann, losing the inner material through the cracks. The cracks seems to be caused as a result of excessive swelling of the bean grains and promoted by vigorous motion in boiling water. Yield and quality of Adjuki raw ann by the new and usual methods and the same treated in boiling water for 90 min were compared. The results were as follows: 1) The average yield of raw ann products was about 68.1% constantly, for 90 min cooking of the new method. While 67.5% as the max. for the usual one of 60 min cooking, decreasing the values by increasing the cooking time. 2) The quality of raw ann made by these two methods which is boiled for 90 min in water, seems to be better in physical aspects than that of raw ann by the usual method. AS

Black beans

- 80 Hincks (MJ), McCannel (A) and Stanley (DW). Hard-to-cook defect in black beans. Soaking and cooking processes. *Journal of Agricultural and Food Chemistry* 35(4); 1987; 576-583

The hard-to-cook defect in dry black beans stored under conditions of high temp. and humidity has been investigated. Water absorption, solids loss and electrolyte leakage were determined for soft and hard black beans during the soaking and cooking processes. It was found that all these three parameters increased during soaking in hard beans. The microscopic evidence indicated reduced starch gelatinisation in hard beans. NGKR

- 81 Hohlberg (AI) and Stanley (DW). Hard-to-cook defect in black beans. Protein and starch considerations. *Journal of Agricultural and Food Chemistry* 35(4); 1987; 571-576

Black beans (*Phaseolus vulgaris*) were stored for 10 months under three environmental conditions [high temp./humidity (HTHH) 30 , 85% RH]; medium temp./humidity (MTMH: 25 , 65% RH); low temp./humidity (LTLH: 15 , 35% RH) in order to determine changes in starch and protein and to assess their contribution in textural defects.

Hard-to-cook defect developed in HTHH-stored seeds and partially in MTMH samples. An increase in the DSC peak starch gelatinization temp. during storage at all three conditions was not related to hardening. Five protein fractions were separated by gel filtration. A significant increase ($P < 0.05$) was found during storage for a low-MW fraction of HTHH and MTMH extracts. At the same time a high-MW fraction decreased significantly ($P < 0.05$), suggesting the breakdown of large proteins. After 10 months of storage, free aromatic amino acids increased significantly ($P < 0.05$) with increasing temp. and humidity of storage. The coincidence of the appearance of small polypeptides and aromatic amino acids with the development of the hard-to-cook defect suggested a relation between these phenomena. NGKR

Black gram

- 82 Kaul (M) and Bajwa (M). Effect of heat and natural fermentation on trypsin inhibitor and haemagglutinins of black gram *Phaseolus mungo*. *Indian Journal of Nutrition and Dietetics* 24(2); 1987; 40-44

A study was carried out to explore the effect of fermentation and growth of different microorganisms on trypsin inhibitory and haemagglutinating activities of black gram (*Phaseolus mungo*) which is the base for a North Indian fermented food Imarti. Black gram dhal was soaked overnight (12 h) at room temp. (30 °C) ground and fermented for 2 and 4 h and the antitryptic activity was determined. The batter was also boiled (420 °C for 20 min) baked (4h) and also fried to test for the effect of these Indian cooking practices on the antinutritional factors. Soaking the pulse overnight decreased the antitryptic activity by 83%, and fermentation for 2 and 4 h decreased it further to 87 and 89% resp. A complete loss of antitryptic activity was noticed on baking, boiling or frying the batter. The spilt dhals were also inoculated with *Escherichia coli*, *Klebsiella pneumoniae*, *Bacillus cereus* and *Staphylococcus aureus* and the antitryptic activity was determined after 16 and 24 h. The antitryptic activity decreased by 65.98 to 68.13% after 16 h and 87.23 to 88.96 after 24 h. and max. decrease was caused by *B. cereus*. NGKR

Field peas

- 83 Ehiwe (AOF), Reichert (RD), Schwab (DJ), Humbert (ES) and Mazza (G). Effect of seed moisture content and temperature on the seed coat durability of field pea. *Cereal Chemistry* 64(4); 1987; 237-239

A modified version of Tangential Abrasive Dehulling Device (TADD) was used to evaluate the effects of seed moisture content (6-20%) and temp. (40 to 90 °C) on seed coat breakage of two cvs of field pea. MVB

Lentils

- 84 Batra (VIP). Effects of cooking and germination on hemagglutinin activity in lentil. *Indian Journal of Nutrition and Dietetics* 24(1); 1987; 15-19

The effect of cooking (by dry heating the flour at 121 °C for 1 and 2 h), autoclaving (121 °C, 15 psi, 10 and 20 min) and heating seeds in boiling water for 10 and 20 min as also germination (for 3 and 6 days) on hemagglutinin activity (HA) have been studied in seven strains of lentil (L-9-12, LH-82-3, LH-82-4, LH-82-6, LH-82-7, LH-21, and LH-311). Dry heating for 1 h, autoclaving for 20 min and heating in boiling water for 20 min were more or less showed equal effect resulting in very low levels of HA. Only in strains LH-21 and LH-311 the activity could not be detected after the treatments and it was

almost negligible in other strains. It was concluded that heating the seeds in boiling water for 20 min is the most economical method for destroying HA. Soaking alone in distilled water reduced the HA by 50% except in HA-82-6 strain; and germination for 6 days reduced the HA further as compared to 3-day germination. NGKR

Moth beans

- 85 Pawar (VD) and Ingle (UM). Improvement in cooking quality and protein digestibility of quick-cooking moth beans *Phaseolus aconitifolius* Jacq. *Indian Journal of Nutrition and Dietetics* 24(4); 1987; 102-107

The effect of presoaking with salt solution containing sodium bicarbonate, sodium carbonate and/or citric acid for 3, 6, 9 and 12 h on the cooking quality, polyphenol content and in vitro protein digestibility (IVPD) of moth beans was studied. The water uptake of beans increased from 77.27 to 100.64 and leaching losses were 14.08 to 20.50% in different treatments after soaking. The cooking time and polyphenol content were found drastically decreased, on soaking in salt solution. However, the % IVPD was increased from 69.0 to 78.1. NGKR

- 86 Santosh Khokhar and Chauhan (BM). Nutrient composition, protein fractions and antinutritional factors of moth bean *Vigna aconitifolia*. *Bulletin of Grain Technology* 24(1); 1987; 3-10

4 var. of *Vigna aconitifolia* moth bean grain were analysed for vitamins, minerals, proteins, protein digestibility and antinutritional factors. The results showed that % protein varied from 21.23 to 26.23; fat from 1.99 to 3.58; ash from 3.24 to 3.61; crude fibre 3.54 to 3.84 and total available carbohydrates 64.72 to 68.04; whereas for thiamin and niacin the range was 0.39 to 0.43 and 1.20 to 1.50 mg/100g resp. The amounts of Ca, P, phytate P, Fe, Zn and Mn ranged from 272.83 to 289.99, 347.49 to 359.99, 240.22 to 253.37, 5.41 to 6.66, 13.95 to 23.75 and 0.63 to 0.68 (mg/100 g) resp. More than half of the P was in the form of phytate and protein digestibility ranged from 58.7 to 62% and trypsin inhibitor activity was extremely low. NGKR

Pigeon peas

- 87 Patnaik (HP) and Samalo (AP). Studies on the susceptibility of pigeon pea varieties to the pulse, beetle, *Callosobruchus maculatus* Fabr. *Bulletin of Grain Technology* 25(2); 1987; 191-193

The varietal response of some promising and early maturing pigeon pea seeds against *Callosobruchus maculatus* Fabr has been studied. The results revealed that the eggs were laid by the gravid females on the test var. and the number of eggs laid varied with var. clearly indicating that the pest has ovipositional preference for particular var. NGKR

OILSEEDS AND NUTS

Almonds

- 88 Teotia (MS), Sukhvir kaur) and Berry (SK). Chemistry and technology of almonds. *Indian Food Packer* 41(5); 1987; 49-90

The review covers chemical and technological aspects of almonds including chemical compositions; bitterness in almonds; products and

processing; microbiology; analytical techniques for estimation of different constituents; and waste utilisation. VKR

Cottonseeds

- 89 Greenberg (RS). Gas chromatographic determination of mecarbam and its metabolites mecarboxon, diethoate, and ethoxon in cottonseeds. *Journal of the Association of Official Analytical Chemists* 70(5); 1987; 870-873

A procedure in which Soxhlet extraction with chloroform after blending to determine mercarbam and its 3 principal metabolites is described. The extract is partitioned with propylene ether-petroleum ether cleaned up on a silica gel column and mecarbam quantitates. For determining metabolites, the extraction procedure is followed only by column chromatographic clean up of the oily extract and by quantitation GC detn. with a flame photometric detection. Samples of cottonseed treated with mecarbam in an agricultural trial were also analysed. MVB

Groundnuts

- 90 Adoga (CI). Role of lipolytic enzymes in the deterioration of groundnut (*Arachis hypogaea*) cakes: A comparison with fresh milk. *Journal of the Science of Food and Agriculture* 41(1); 1987; 65-68

These studies revealed that the free fatty acids (FFA) contents of fresh milk and groundnut (*Arachis hypogaea*) cakes released by the lipase activity can be used to assess their deterioration at 26 °C and 4 °C. Experiments showed lipolysis of fresh milk as measured by FFA was about 69% complete in 24 h and 86% in 48 h at 26 °C whereas in groundnut cakes lipolysis was 15 % complete in 48 h and 80% complete after 4 days at 26 °C. However the deterioration in both materials is found to be min. at 4 °C. It is therefore recommended that groundnut cakes be stored at below ambient temp. under dry or lower humidity conditions. NGKR

Jojoba meal

- 91 Wisniak (J), Hillel (J) and Katz (O). Holdup and extraction characteristics of jojoba meal. *Journal of the American Oil Chemists' Society* 64(9); 1987; 1352-1354

Holdup and drainage characteristics have been determined for three jojoba meals of different nature and size distribution, using hexane and isopropanol as solvents. Density and viscosity properties of the oil-solvent solutions have been measured. The experimental information should be of value in the design of solvent extraction equipment for jojoba nuts. AS

Rapeseeds

- 92 Fiebig (H-J) and Kallweit (P). Results of a ring test for rapid determination of total glucosinolate content in oilseed rape. *FAT Science and Technology* 89(4); 1987; 135-139

Sesame

- 93 Vijaya Khader and Venkat Rao (S). Supplementary relationship between the protein of sesame and Bengal gram, green gram and horse gram. *Indian Journal of Nutrition and Dietetics* 24(3); 1987; 64-67

This paper describes the results of studies on rats on the nutritional quality of proteins of various blends based on Bengal gram, green gram, horse gram(whole and dhal) and solvent extracted edible sesame flour to assess the mutual supplementary relationships between the proteins of sesame and legumes. The blends prepared had legume content of 96.1 to 23.5% and sesame content of 3.9 to 76.5%. The results revealed that blends containing 60% of protein from Bengal gram, green gram and whole horse gram and 40% of protein from sesame flour were the most suitable combinations as judged from PER and growth rate of rats. It was found by addition of even 4% sesame flour to horse gram dhal the protein quality is markedly improved. In other blends it was necessary to add more than 4% sesame flour to increase PER. The protein quality of these sesame blends is comparable to milk. NGKR

Soybeans

- 94 Honig (DH) and Wolf (WJ). Mineral and phytate content and solubility of soybean protein isolates. *Journal of Agricultural and Food Chemistry* 35(4); 1987; 583-588
- 95 Laszlo (JA). Mineral binding properties of soy hull: Modeling mineral interactions with an insoluble dietary fiber source. *Journal of Agricultural and Food Chemistry* 35(4); 1987; 593-600
- 96 Nosworthy (N) and Caldwell (RA). The zinc(II) binding sites of soybean glycinin. *Journal of the Science of Food and Agriculture* 41(1); 1987; 55-63

Soy proteins

- 97 Yamagishi (T), Takahashi (N) and Yamauchi (F). Covalent polymerization of acidic subunits on heat-induced gelation of soybean glycinin. *Cereal Chemistry* 64(4); 1987; 207-212

Soypaneer

- 98 Gandhi (AP) and Nawab Ali. Preparation of soypaneer at rural level. *Indian Journal of Nutrition and Dietetics* 24(2); 1987; 45-50

Attempts were made to develop a low cost technology for making soypaneer at domestic and rural level. Results showed that from one kg soybean about 1.5-2.0 kg of soypaneer was obtained by this process which is simple and can be easily adopted by the villagers with the assets/gadgets available with them. The processes consists of splitting the clean, sound soybeans using hand stone grinder, steeping the cotyledons in water for 4 h, homogenization in hot water using wet grinder, boiling for 15-20 min, filtration through muslin cloth, coagulation using citric acid or magnesium sulphate or calcium sulphate and pressing through paneer forming boxes with $10 \text{ kg}/(\text{cm}^2)$ pressure to get a desirable texture. This product costs Rs. 5/kg and has about 8% protein and 4% fat content. NGKR

TUBERS AND VEGETABLES

Root vegetables

Carrots

- 99 Ramdas (AR) and Kulkarni (PR). Fermentative preservation of carrots. *Indian Food Packer* 41(5); 1987; 40-48

Carrots of different sizes were fermented for 6 days at room temp. (30 plus or minus C) after adding common salt (2-10%) and also after adding 0.1% calcium chloride, 1% glucose, 1% sucrose, and 0.1% sorbic acid. The fermented product was washed, steamed for 3 min, cooled and kept in 2% brine containing 1% acetic acid and pasteurised. The product was stored for 4 months at room temp. and evaluated. Based on the organoleptic evaluation, the product with 2% brine was the best with respect to taste, flavour, and overall acceptability. The product had a final pH of 3.38 and acidity of 0.78% (as lactic acid). 60% of the carotenoids were retained during 4 months storage at room temp. Addition of 1% sucrose is beneficial compared to 1% glucose for development of acidity. Addition of 0.1% calcium chloride improved texture, and sorbic acid (0.1%) gave protection against film yeasts. KAR

Onions

- 100 Sugimoto (T), Hayashi (T), Kawashima (K), Shi-ina (T), Kawano (S) and Aoki (S). Prolongation of shelf life of small onions by gamma-irradiation. Report of the National Food Research Institute '(Shokuryo Kenkyusho Kenkyu Hokoku') 62(3); 1987; 9-17 (Ja).

Irradiated small onions (*Pecolosu*, *Allium cepa* L. CV. Kaizukawase) stored at 5 C were studied for radiation effect on their sprouting and mechanical properties. Gamma-irradiation of small onions at a dose of 10, 30, or 70 GY by using a Gamma Cell 220 effectively inhibited sprouting and that the mechanical properties of the onions are unaffected by the irradiation. BV

Tubers

Potatoes

- 101 Kalra (CL), Sukhvir Kaur Sharma (TC), Kulkarni (SC), Berry (SK). Studies on the preparation, packaging and storage of potato snacks from cold stored potatoes. *Indian Food Packer* 41(5); 1987; 30-39

Physico-chemical and organoleptic changes in the potato snacks prepared from cold stored and newly harvested potatoes were investigated during storage period of 6 months at room temp., (13.38 C, RH 30-90%). Potato snacks were also added with starch (5-30%) and spices. Deep fat fried potato snacks made from new potatoes contained 7.26 to 8.55% protein and absorbed 19.7 to 22.0% oil as against those snacks made from old potatoes with the incorporation of starch were low in protein and absorbed lesser amount of oil on frying. The quantity of oil absorbed decreased with increasing proportion of maize starch in the snacks. The equilibrium relative humidity of potato snacks (initial moisture 11.05%) was 59.7%. Potato snacks were packed in LDPE bags (100 and 150 gauge) and in friction top tins and stored for 6 months. The peroxide value of potatoes from cold stored and newly harvested potatoes changed from nil to 2.22 and from 0.05 to 7.69 meq

oxygen/kg product during the 6 months storage period. A gradual pickup of moisture was recorded during the storage periods. The product packed in 150 gauge LDPE bags were acceptable up to 6 months storage and may be consumed after deep fat frying. KAR

- 102 Stevens (CA) and Gregory (KF). Production of microbial biomass protein from potato processing wastes by *Cephalosporium eichhorniae*. *Applied and Environmental Microbiology* 53(2); 1987; 284-291

Sweet potatoes

- 103 Mamta Bargale), Sawarkar (NJ) and Sharma (YK). Minerological composition of water chestnut as compared to sweet potato. *Indian Journal of Nutrition and Dietetics* 24(3); 1987; 78-82

Studies were undertaken to know the nutritional significance of water chestnut and sweet potato by determining the macro and micro minerals in the dried powders of two local red and white var. of water chestnut and two cultivated var. of sweet potato (Jawahar-145, Jawahar-114). Results showed that P content was higher in sweet potato (7.60 and 75.30 mg/100g); than water chestnut (45.00 and 48.30 mg/100g); S was higher in water chestnut (130.16 and 122.81 mg/100g) than sweet potato (46.70 and 45.98 mg/100g); Ca is rich in sweet potato (560 and 562 mg/100g) than water chestnut (60 and 20 mg/100g); Mg is rich in water chestnut (200 and 160 mg/100g) than sweet potato (60-64 mg/100g); Na is rich in sweet potato (275 and 278 mg/100g) than in water chestnut (100 and 80 mg/100g); K was nearly same 1600-1800 mg/100 in both whereas Mn was almost same in both (11.36-18.93 p.p.m). Fe was more in sweet potato (305-306 p.p.m) than water chestnut 129-145 p.p.m). It is seen that tubers of sweet potato were the rich source of P, Ca, Na and Fe as compared to water chestnut. NGKR

Vegetables

- 104 Buckenhuskes (H) and Gierschner (K). Characterization of lactofermented vegetable juices from the market. *Flussiges Obst* 54(2); 1987; 62-65

Covers properties of lactofermented vegetable juices, including nutritional aspect, sensory properties chemical analysis, "pH"-values, total acidity, lactic acid, acetic acid, sugar contents, vitamin C, dry matter, mineral components, and nitrogen compounds. BV

Leafy vegetables

- 105 Dall'Aglio (G), Carpi (G), Versitano (A) and Palmieri (L). Dehydration of spinach. *Industria Conserve* 62(1); 1987; 17-21 (It).

Spinach dehydrated by coupling air drying (Sucked-air tunnel) and drum drying techniques showed low bacterial load and good functional characteristics. BV

Amaranthus

- 106 Garcia (LA), Alfaro (MA) and Bressani (R). Digestibility and protein quality of raw and heat-processed defatted and nondefatted flours prepared with three amaranth species. *Journal of Agricultural and Food Chemistry* 35(4); 1987; 604-607

The study was carried out to determine whether removing hexane extractables from three amaranth species improved protein quality of the grain as compared to heat processing. It also examined whether or

not feeding the grain induced pathological damage to rats organs. Hexane-extracted samples were cooked at atm. pressure or drum dried. These preparations were fed in 10% protein diets to weanling rats for standard PER digestibility studies. Atmospheric cooking of the whole and of the defatted materials gave higher food intake, wt. gain, and PER than non-heat-treated samples. Drum drying of the fat-free flours always resulted in lower quality than atm. cooking. Organ wt. and appearance for *A. cruentus* fed rats were normal. Results showed growth reducing factors of amaranth grain to be still present in the raw fat-free flour. AS

- 107 Mendoza (MC) and Bressani (R). Nutritional and functional characteristics of extrusion-cooked amaranth flour. *Cereal Chemistry* 64(4); 1987; 218-222

This study was conducted to determine if extrusion cooking of two var. amaranth grain affected their nutritional value and their functional characteristics for food product development, particularly for preschool children. Results showed that a food product containing 45.64% of extruded and hydrolysed amaranth flour with 8.72% milk and 45.64% sugar was generally acceptable. MVG

Cabbages

- 108 Nawa (Y), Hosoda (H), Shiina (T), Ito (H) and Kurogi (M). Quality evaluation and preservation of shredded vegetables. Changes in total phenol content and polyphenol oxidase activity in different cultivars and cabbage during storage after shredding. Report of the National Food Research Institute '(Shokuryo Kenkyusho Kenkyu Hokoku)' 62(3); 1987; 65-69 (Ja).

Relationship between browning of shredded cabbage and the activity of oxidases (Phloroglucinol and peroxidase) was studied in 5 cvs ('Nozaki', '201', '60', 'Nakawase' and 'Orora No1'). The phenol contents and activity of enzymes in response to cutting plays an important role in browning of shredded cabbages during storage. BV

- 109 Nawa (Y), Hosoda (H), Shina (T), Ito (H) and Kurogi (M). Quality evaluation and preservation of shredded vegetables. I. Effect of shredding on changes in organic components of cabbage. Report of the National Food Research Institute '(Shokuryo Kenkyusho Kenkyu Hokoku)' 62(3); 1987; 56-64 (Ja).

Shredding of cabbage leaves effected changes in the contents of chlorophyll, reducing sugar, ascorbic acid, amino acids and phenols during storage at 1 and 10 C. Total phenol contents increased markedly during storage at both 1 and 10 C by about 50 and 70% resp. Reducing sugars also showed remarkable changes during storage at both 1 and 10 C. These two components serve as indicators of quality evaluation of shredded cabbage. BV

Capsicum

- 110 Krajewska (AM) and Powers (JJ). Gas chromatographic determination of capsaicinoids in green Capsicum fruits. *Journal of the Association of Official Analytical Chemists* 70(5); 1987; 926-928

A new GC method is described that uses a simple on-column methylation for the quantitative detn. of the major naturally occurring capsaicinoids. Capsaicinoids are extracted from the dry sample with acetone in a Soxhlet apparatus, purified by extraction with petroleum ether and water, mixed in a microsyringe with trimethylani-

linium hydroxide solution, and injected onto the GC column. The methylated capsaicinoids thus formed require 16 min for elution. The GC response is linear with increased concn. of capsaicinoids. AS

Tomatoes

- 111 Bolzoni (L), Bandini (M) and Proto (D). Temik residues in fresh tomatoes and commercial tomato products. *Industria Conserve* 62(1); 1987; 7-10 (It).

Describes an analytical methods (Gc on SE 54 capillary column with thermionic nitrogen-phosphorus detection) for determining residues of aldicarb (Temik) and its toxic metabolites (aldicarb sulphoxide and aldicarb suphone) in fresh tomatoes and commercial tomato products. The sensitivity of the method is 0.01 RPM in fresh tomatoes and 0.04 p.p.m. in tomato paste; recoveries range from 65 to 95 %. BV

- 112 Buttery (RG), Teranishi (R) and Ling (LC). Fresh tomato aroma volatiles: A quantitative study. *Journal of Agricultural and Food Chemistry* 35(4); 1987; 540-544

The nonvolatile flavour components of fresh tomatoes have been carried out and results presented in this paper. The identities were confirmed by GC-MS methods and it was shown that refrigerated storage of fresh tomatoes was found to lower some of the volatiles and hence was found to be deleterious to fresh tomato flavour. It was also seen that there is a lack of flavour in fresh market tomatoes. NGKR

- 113 Dellaglio (F), Torriani (S), Bosi (F), Scolari (CL) and Sarra (PG). Characterization of lactic-acid and aerobic spore-forming bacteria isolated from strained tomatoes. *Industria Conserve* 62(1); 1987; 11-16 (It).

Nineteen samples of spoiled strained tomatoes in glass bottles were examined. 61 strains of lactic acid bacteria and mesophilic aerobic sporeforming bacteria were isolated from them. *Lactobacillus fermentum* and *L. delbrueckii* subsp. *lactis* are the most frequent strains. Two strains, one nonfermentative and the other heterofermentative inoculated into strained tomatoes reproduced the spoilage. The mesophilic aerobic spore forming bacteria are *Bacillus licheniformis* and *B. polymyxa*. BV

- 114 Ramana (SV), Mohan Kumar (EL) and Jayaraman (KS). Extension of storage life of tomato (*Lycopersicon esculentum*) under ambient conditions by continuous flushing of storage atmosphere. *Indian Food Packer* 41(5); 1987; 24-29

In this investigation, tomatoes (cv. Sious) were stored under continuously flushed storage atm. at room temp. (23-30 °C). The treatments consisted of continuous flushing of storage atm. with 3% potassium permanganate solution kept in the storage chamber for ethylene absorption (T₁); raw tomatoes dipped in 2% calcium chloride solution (T₂); packed in polyethylene bags (300g) without ventilation along with an ethylene absorbent (T₃); packed in ventilated polyethylene bag containing ethylene absorbent (T₄); packed in polyethylene bag without ventilation (T₅); and kept as such (T₆) as control at room temp. During storage, soluble solids content increased slowly and the fruit firmness reduced. The tomatoes in T₁, T₂, T₃, T₄, T₅, and T₆ stored free from noticeable spoilage for 18, 9, 9, 12, 9 and 8 days resp. The fruits were acceptable organoleptically. VKR

FRUITS

Apples

- 115 Conway (WS) and Sams (UE). The effect of postharvest infiltration of calcium, magnesium, or strontium on decay, firmness, respiration and ethylene production in apples. *Journal of the American Society for Horticultural Science* 112(2); 1987; 300-303

The effect of exogenously applied chloride formulations of calcium, magnesium and strontium on decay, firmness, respiration ethylene production, injury and analysed for concn. of the appropriate cation, was studied. Delicious apples (*Malus domestica* Borkh.) were pressure infiltrated (68.95 KPa) above atm. at harvest with calcium chloride, magnesium chloride or strontium chloride. After 5 months in storage at 0 °C the fruits were removed, wound inoculated with a conidial suspension of *Penicillium expansum*, and kept for 7 days at 20 °C. Calcium was significantly better than magnesium or strontium for reducing decay and ethylene production while maintaining firmness. Cation treatments had little effect on respiration but magnesium chloride treatment caused unacceptable surface injury. BV

- 116 Dick (AJ), Redden (FR), DeMarco (AC), Lidster (PD) and Grindley (TB). Flavonoid glycosides of Spartan apple peel. *Journal of Agricultural and Food Chemistry* 35(4); 1987; 529-531

The flavour glycosides of Spartan apples isolated by column chromatography on polyamide and Sephadex resins and by reverse phase-HPLC. The results indicated the presence of phlorizin and quercetin glycosides viz. Alpha-L-arbinofuranoside, Beta-D-galactopyranoside, Beta-D-glucospyranoside, Alpha-L-rhamnopyranoside, Beta-D-xylopyranoside. NGKR

- 117 Senesi (E), Forni (E), Bertolo (G), Vigano (L) and Maestrelli (A). Packaging of solid pack apples in retort pouches. 1st. *Industrie Alimentari* 26(4); 1987; 369-374 (It).

The organoleptic evaluation of the quality of the "solid pack" type apples packed in retort pouches and in tinned cans are reported. Texture and colour showed a good stability of the product packed in the retort pouches after a 12 months storage. Colour remained more stable in the pouches than in the cans. The apple slices packed in the retort pouches were stored at 0.2 °C did not show any need for a refrigerated storage. Economic advantages of the retort pouches packaging is also discussed. BV

Citrus

- 118 Orme (ED) and Hasegawa (S). Inhibition of nomilin accumulation in *Citrus limon* fruit by naphthaleneacetic acid. *Journal of Agricultural and Food Chemistry* 35(4); 1987; 512-513

1-naphthalene acetic acid (NAA), a synthetic auxin is also a potent inhibitor of nomilin biosynthesis in the stems of mature lemon trees and that the NAA treatment reduces the accumulation of nomilin in the fruit. It was shown that radioactive tracer work demonstrated that (NAA) inhibits the accumulation of limonoids in detached stem and fruit tissues of mature lemon trees. The various findings suggested that NAA may be potential bioregulator for reduction of bitter limonoids in citrus fruits. NGKR

Grapes

- 119 Tesniere (C), Raymond (P) and Abbal (P). Sampling size for determination of adenine nucleotide contents in mature grape berries application to reference samples analysis. *Sciences des Aliments* 7(3); 1987; 447-458

An investigation of wt. and adenine nucleotides(AdN) content on 50 individual mature grape berries revealed important variability. The factor involved in wt. distribution in the AdN distribution could be the number of pips per berry. The difference in the AdN distribution could be the variation introduced in the ADP and AMP detn. by subtraction with the ATP assay. No correlation has been found between the AdN level and the wt. of the berries. The discrimination of berries by weight cannot be used to reduce the sample size. The sample size was determined by the relation $N=4 \text{ Sigma}^2 / L^2$ for a risk Alphas = 5% (Sigma: variance; L: difference between two means). The sampling of six berries yields to a variation rate of plus or minus 11%, plus or minus 6%, plus or minus 3.5% for ATP, ADP and AMP resp. These results applied to the comparison of reference samples revealed that AMP changes with the duration of berry conservation, being due probably to an alteration of the tissue. ATP is modified by the temp. of berries at the time of fixation reflecting a modification of oxygen diffusion in the tissues. AS

Kiwifruits

- 120 Soda (I), Kaneko (M), Sato (T), Nakagawa (H) and Ogura (N). Studies on utilization of Kiwifruit protease. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi') 34(1); 1987; 36-41 (Ja).

From the view point of utilization of kiwifruit(*Actinidia chinensis* Planch) protease for food, fundamental study was performed. Proteolytic activity extracted from fresh kiwifruit was compared with those from fig, pineapple and papaya fruits and the activity was found to be a little lower than those from fig and pineapple, but slightly higher than that from papaya. Proteolytic activity from kiwifruit increased in the course of fruit ripening. The activity in core was about 17% of that in pericarp. When the crude enzyme solution was kept for 24 h at 20 C, 4 C and -20 C resp., substantial loss of activity was not observed at 4 C and -20 C. On the other hand, about 30% of initial activity was lost at 20 C. When the crude enzyme solution was kept at -20 C for a long term, activity was stable and decreased gradually to a level of 75% of initial one after 3 months. When lyophilized powder of the fruit was stored in desiccator at 20 C, the activity was relatively stable and there remained 80% activity even after stored for one month under this conditions. Crude enzyme had an optimal pH at 4.2. It was stable after heating for 5 min at 50 Degree C but unstable at 60 C. Crude enzyme showed a high level of caseinolytic and gelatinolytic activity, and digested cuttlefish, and sasami well at 12 C for 24 h. AS

Lemons

- 121 Kon (M) and Shinba (R). Seasonal changes in color and carotenoid composition of yuzu (*Citrus junos* Tanaka) and Lisbon lemon (*Citrus Limon* Burm. f.) peel. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi') 34(1); 1987; 28-35 (Ja).

Lisbon lemon showed a minus value in Hunter's chromatic "a" value, for about one month after its colour reached pale yellow.

There was high correlation between "a" value and carotenoid content during increase of carotenoid, but not between the "a" value and Brix-acid ratio in the juice of either yuzu or lemon. The chlorophyll content in the Yuzu peel was high in the green stage and the diminished in the yellowish orange stage. In the case of the lemon, chlorophyll content was less than half of the Yuzu in the green stage, but small amount still remained during the pale yellow stage. After the disappearance of chlorophyll, the carotenoid content of the Yuzu tended to rise sharply, reaching higher level than that in the green stage. In the Yuzu peel during the green stage Diol (D) content was the highest, and the Hydrocarbon (H) and Diol Diepoxide (DD) followed. AS

- 122 SU (HCF) and Horvat (R). Isolations and characterization of four major components from insecticidally active lemon peel extract. *Journal of Agricultural and Food Chemistry* 35(4); 1987; 509-511

Four major components from the lemon peel hexane extract have been identified for their chemical structures to elucidate the insect biological activity by thin layer chromatography and high pressure liquid chromatography. They were bioassayed against *Sitophilus oryzae* (L.) and *Callosobruchus maculatus* (F) by a topical application method. Three compounds showed weak to moderate toxicity to the test insects, but were less toxic when compared to that of the original extract while one compound was non toxic to *C. maculatus* or slightly toxic to *S. oryzae*. KAR

Litchi

- 123 Tripathi (VK), Kaphalia (BS), Seth (TD) and Surjeet Singh. Composition of litchi cultivars. *Indian Food Packer* 41(4); 1987; 7-10

Biochemical composition of four var. of litchi (Desi, Calcuttia, Rose Scented and Late Badana) grown in Uttar Pradesh, India was assessed for fresh consumption and for processing. pH was same in the four var. Soluble solids (19 Degrees Brix), acidity (0.256%), reducing sugar (9.74%), total sugar (12.59%), protein (4.915 mg/g), P (0.167 g/100 g), Ca (45 mg/l), Zn (2.6 mg/l) was max. in Rose Scented var. while Na (333 mg/l), 9193 mg/l was max. in Calcuttia var. High % of ascorbic acid (30 mg/100 g), tyrosine (1,875 g/100 g), Cd (0.022/l) and Cu (3.35 mg/l) was found in Desi var. Late Badana contains high amount of juice (48.28%), pulp (72.43%), Pb (1.3 mg/l), Mn (0.40 mg/l) and Fe (9.05 mg/l) aqs compared to other three var. VKR

Mandarins

- 124 Mazza (C). Gas chromatography and mass spectrometry study of the aromatic composition of mandarine essential oil. *Sciences des Aliments* 7(3); 1987; 459-479

One hundred fifty two volatile components were detected in mandarin essential oil (*Citrus nobilis* var. *deliciosa* Swingle mandarin or *Citrus reticulata* Blanco var. mandarin) by gas chromatography-mass spectrometry, including 24 hydrocarbons, 52 alcohols, 10 esters, 38 carbonyl compounds, 12 (ep) oxidocompounds, 6 phenols and 3 acids. A total of 117 components were identified, 57 of them for the first time, and the most meaningful qualitative and quantitative differences between fresh and aged oils were also displayed. The importance of minor components for the development of mandarin aroma is also pointed out, these components being the most significative from the aromatic point of view. AS

Papaya

- 125 Morales (AL) and Duque (C). Aroma constituents of the fruit of the mountain papaya (*Carica pubescens*) from Colombia. *Journal of Agricultural and Food Chemistry* 35(4); 1987; 538-540

Peaches

- 126 Ferreira (JR), Falcao (MM) and Tainha (A). Residues of dimethoate and omethoate in peaches and apples following repeated applications of dimethoate. *Journal of Agricultural and Food Chemistry* 35(4); 1987; 506-508

In order to assess whether the preharvest interval established in Portugal complies with international max. residue limits for dimethoate together with the interest of determining omethoate residues resulting from the above mentioned use of dimethoate residue disappearance studies were carried out and results presented in this paper. Repeated applications of dimethoate were carried out on peaches and apple trees in order to know the max. number of dimethoate sprays that will result in residues within the max. residue limits permitted. The residues over 3-4 wks after last spray were estimated by GLC. Results showed that only in case of apples with seven applications mean residues of dimethoate exceeded 1 p.p.m at the end of 14 days and residue levels of omethoate were below 0.2 p.p.m. The need of restrictions on the number of applications during apples growthcycle is indicated. NGKR

Pears

- 127 Nawa (Y), Hosoda (H) and Kurogi (M). Activity of endo-type polygalacturonase of Bartlett pear during the postharvest ripening. Report of the National Food Research Institute '(Shokuryo Kenkyusho Kenkyu Hokoku)' 62(3); 1987; 37-42 (Ja).

Pomegranates

- 128 Saxena (AK), Manan (JK) and Berry (SK). Pomegranates Post-harvest technology, chemistry and processing. *Indian Food Packer* 41(4); 1987; 43-60

This review covers: Pomegranate production; cultivated var./types; harvest and yield; biochemical changes during maturation; packaging and storage; physicochemical characteristics; and processing. VKR

Quince

- 129 Mihara (S), Tateba (H), Nishimura (O), Machii (Y) and Kishino (K). Volatile components of Chinese quince (*Pseudocydonia sinensis* Schneid). *Journal of Agricultural and Food Chemistry* 35(4); 1987; 532-537

The very powerful flavour compounds in Chinese quince present in peel and flesh were analysed by gas chromatography and GC/MS out of total of 111 compounds identified 84 compounds consisted of 4 hydrocarbons, 50 esters, 6 alcohols, 6 aldehydes, 3 ketones, 3 acids, 3 lactones, 6 acetals, and 3 miscellaneous compounds in the peel oil. From the flesh 42 compounds were identified and the peel oil concn. was thought to be more important to the Chinese quince aroma than that from the flesh. NGKR

CONFECTIONERY, STARCH AND SUGAR

Confectionery

Chocolates

- 130 Geeraert (E) and Sandra (P). Capillary GC of triglycerides in fats and oils using a high temperature phenylmethylsilicone stationary phase. Part II. The analysis of chocolate fats. *Journal of the American Oil Chemists' Society* 64(1); 1987; 100-105

The analysis of the fats and oils used in the chocolate industry are reported. Triglyceride mixtures are directly injected on an FSOT column coated with a phenylmethylsilicone gum stationary phase. On phenylmethylsilicone phase, besides a carbon number separation, the triglycerides are separated according to the different combinations of saturated and unsaturated fatty acids in the triglycerides. Cocoa butters of different origin were analyzed and their POP:POS:SOS ternary diagram is discussed. The profiles of the non-cocoa butter fats such as butter oil, oils originating from nuts (e.g.; hazelnut, almond, Brazil nut, walnut) and cocoa butter equivalents are presented. The elucidation of a complex chocolate fat mixture is shown and discussed in view of the recognition of the different constituents (pattern recognition) and in view of the detection and quantification of adulterations. AS

Sugar

- 131 Friedemann (I). About the rational energy consumption in the sugar industry. *Lebensmittelindustrie* 34(2); 1987; 76-79 (De).

Present status and trends of energy consumption in the sugar industry of the GDR is discussed. New energy saving processes are also considered. BV

- 132 Gutknecht (E). Advances in processing of raw cane sugar. *Lebensmittelindustrie* 34(2); 1987; 69-72 (De).

The application of new processes and the computer-aided process control in sugar refineries results in better efficiency. The processing and conversion of the juice into syrup and special sorts of sugar with possibility to increase the yield to expand the assortment and cost efficiency are discussed. BV

- 133 Westphal (G), Vogel (J) and Pusch (D). Comparing examinations about the enzymic and polarimetric analysis of sucrose in selected products of sugar refineries. *Lebensmittelindustrie* 34(2); 1987; 73-76 (De).

The comparison of the polarimetric and enzymatic analysis of the sucrose concn. in molasses and thick juice shows significantly lower values after the polarimetric method than after the enzymatic method. A higher content of sucrose has been ascertained in selected products of sugar refineries after clarification by lead acetate or carrez solution than in unclarified samples. Advantages and disadvantages of the enzymatic method and its range of application are discussed. AS

BAKERY PRODUCTS

Bread

- 134 Hino (A), Takano (H) and Tanaka (Y). New freeze-tolerant yeast for frozen dough preparations. *Cereal Chemistry* 64(4); 1987; 269-275

Activated baker's yeast after initial fermentation was more susceptible to freeze damage than nonactivated yeast. In this study, new freeze-tolerant yeasts were isolated from banana peel and identified as *Kluyveromyces thermotolerans* and *Saccharomyces cerevisiae*. These yeasts retained their fermentative ability and bread leavening activity even after one to six wks of frozen storage in fully prefermented dough. Frozen dough made with these yeasts gave good quality bread similar to that made from unfrozen dough using baker's yeast. AS

- 135 Stollman (U) and Lundgren (B). Texture changes in white bread: Effects of processing and storage. *Cereal Chemistry* 64(4); 1987; 230-236

Effect of different time-temp. conditions during preparation and fermentation of the dough on sensory, aroma, flavour and texture of white bread was the aim of the project and in this paper results of the texture evaluations are reported. Instrumental texture measurements of the crumb were also carried to supplement sensory evaluation. MVG

- 136 Wisker (E), Hudtwalcker (O), Ramminger (B) and Feldheim (W). Phytic acid content of heavy ballast-holding breads. *Deutsche Lebensmittel-Rundschau* 83(1); 1987; 13-15 (De).

A detn. of phytic acid was performed on dietary fiber rich breads (whole meal breads and breads enriched with wheat bran or brewer's spent grain) in the whole meal breads most of the phytic acid of the meal was hydrolyzed during fermentation of the dough. Fiber enrichment with wheat bran produced higher contents of phytic acid than enrichment with brewer's spent grain. AS

Cakes

- 137 Pierce (MM) and Walker (CE). Addition of sucrose fatty acid ester emulsifiers to sponge cakes. *Cereal Chemistry* 64(4); 1987; 222-225

MILK AND DAIRY PRODUCTS

Milk

- 138 Margolis (SA) and Black (I). Stabilization of ascorbic acid and its measurement by liquid chromatography in nonfat dry milk. *Journal of the Association of Official Analytical Chemists* 70(5); 1987; 806-809

Bovines milk

- 139 Mourot (D), Dagorn (M) and Delepine (B). Liquid chromatographic determination of depletion of bithionol sulphoxide and its two major metabolites in bovine milk. *Journal of the Association of Official Analytical Chemists* 70(5); 1987; 810-812

A liquid chromatographic method was developed with a reliable

detection level of 0.025 of bithionol sulfoxide in milk samples. Data on depletion of bithionol sulfoxide and its 2 metabolites, bithionol and bithionol sulfone, in milk, of treated lactating cows are also presented. MVB

Milk products

Butter

- 140 Smith (RL), Sullivan (DM) and Richter (EF). Determination of phytosterols in butter samples by using capillary column gas chromatography. *Journal of the Association of Official Analytical Chemists* 70(5); 1987; 912-915

Adulteration of butter oils was detected by determining the presence of Beta-sitosterol. When direct saponification extraction techniques and packed column GC were used, an interfering compound, which was later confirmed as lanosterol, coeluted with Beta-sitosterol. MVB

Cheese

- 141 Alonso (L), Ramos (M), Martin-Alvarez (PJ) and Juarez (M). Application of stepwise discriminant analysis to parameters for characterizing frozen Cabrales cheeses. *Journal of Dairy Science* 70(5); 1987; 905-908

Stepwise discriminant analysis was applied to different physico-chemical characteristics, proteolysis and lipolysis of reproduced Cabrale cheese in order to use these parameters to distinguish cheese that had ripened from stored frozen curd from those that had ripened from fresh curd. BV

- 142 Karahadian (C) and Lindsay (RC). Integrated roles of lactate, ammonia, and calcium in texture development of mold surface ripened cheese. *Journal of Dairy Science* 70(5); 1987; 909-918

Some key constituents of both pure microbial cultures and ripening Brie cheese were measured and the data used in support of the development of an integrated conceptual model incorporating several simultaneous processes to account for texture development in mold surface-ripened cheese. MVB

- 143 Francis (OJJr), Ware (GM), Carman (AS), Kirschenheuter (GP), Kuan (SS) and Newell (RF). Thin-layer chromatographic determination of sterigmatocystin in cheese: Interlaboratory study. *Journal of the Association of Official Analytical Chemists* 70(5); 1987; 842-844

The method comprises of extraction of cheese with acetonitrile - 4% KCl (85 + 15). A simplified liquid is used and the sample extract is passed through a cupric carbonate-celite column for final purification. Sterigmatocystin is quantified using one-dimensional TLC after the plate is treated with the fluorescence enhancing sprays consisting of 15% aluminium chloride in EtOH and silicone-ether (18 + 82). The collaborative study of this already repeated procedure, indicates that it is applicable, after suitable modifications, to the detn. of sterigmatocystin at low levels (5 - 50 p.p.b) for the purpose of surveys. As there was some difficulty with TLC in this study it is recommended that a more satisfactory determinative step be developed. Recommendation for official first action status is deferred. MVB

Yoghurt

- 144 Nila (DV), Rathi (SD) and Ingle (UM). Studies on qualities of fruit yoghurt. *Indian Food Packer* 41(4); 1987; 19-22

Fruit yoghurt was prepared by blending the plain yoghurt with fruit juices/pulps (10 to 15%) from guava, orange, mango and banana. The yoghurt blended with 10% banana pulp had the highest acidity of 1.01% and lowest acidity of 0.79% was found in yoghurt blended with 15% mango pulp. The curd tension at 31.50 g was max. in yoghurt blended with 10% orange juice and min. at 29.75 g in 10% mango pulp blended yoghurt. Although guava blended yoghurt showed highest viscosity but no specific effect of fruit juice blends and their levels was observed on viscosity of fruit yoghurt. The effect of fruit and its level of concn. did not affect the appearance, aroma, taste and overall acceptability of the fruit yoghurt. KAR

Milk proteins

Casein

- 145 Sanogo (T), Paquet (D) and Linden (G). Bovine casein proteolysis in salt medium study of four proteinases. *Sciences des Aliments* 7(3); 1987; 385-398 (Fr).

The halophilic character of alcalase, neutrase, papain and chymosin was studied. The influence of pH and salt concn. on proteolytic activity shows that in a 1% NaCl concn.(W/V), the alcalase, neutrase and papain have a low activation below pH 7; their residual activity in a 10% salt solution remains important (60 to 70% of initial activity). The papain shows a slight modification of its optimum pH in presence of salt. The studies of hydrolysates in SDS-polyacrylamide gel electrophoresis reveal that at pH 6.5 and 8, the alcalase and neutrase liberate resp. the same peptides. Whereas the case in hydrolysis by papain is salt dependent. The chymosin is highly inhibited by salt and has only 10% of its initial activity in presence of KCl 10%. The electrophoretic study of these enzyme hydrolysates at pH 6.5 and 5 shows that the resulting peptides are pH and salt dependent. In the salt medium, a peptide of the same electrophoretic mobility as paracasein is liberated at pH 6.5 but not at pH 5. AS

MEAT AND POULTRY

Meat

- 146 Etherington (DJ), Taylor (MAJ) and Dransfield (E). Conditioning of meat from different species. Relationship between tenderising and levels of cathepsin B, cathepsin L, calpain I, calpain II. and Beta-glucuronidase. *Meat Science* 20(1); 1987; 1-18
- 147 Foegeding (EA), Dayton (WR) and Allen (CE). Evaluation of molecular interactions in myosin, fibrinogen, and myosin-fibrinogen gels. *Journal of Agricultural and Food Chemistry* 35(4); 1987; 559-563
- 148 Heath (AB) and Black (RR). Assisted distillation cleanup of pesticide residues in animal fats: New beadless distillation tube. *Journal of the Association of Official Analytical Chemists* 70(5); 1987; 862-865

A new assisted distillation tube has been developed which con-

tain no glass wool, thereby increasing the number of uses before cleaning is required. It has top injection and can be easily fitted into the apparatus. The tube has been evaluated over a limited range of temp. and flow rates. Its performance is also compared with that of a unitrex tube. MVG

- 149 King (NL). Thermal transition of collagen in ovine connective tissues. *Meat Science* 20(1); 1987; 25-37

The present work was undertaken to investigate the var. in collagen stability over a wider range of anatomical locations in sheep of different ages. MVG

- 150 Korsrud (GO), Naylor (JM), Salisbury (CD) and MacNeil (JD). A comparison of three bioassay techniques for the detection of chloramphenicol residues in animal tissues. *Journal of Agricultural and Food Chemistry* 35(4); 1987; 556-559

- 151 Kovar (K-A) and Rupp (K-P). Total creatinine determination in meat extracts and meat-extract-holding foodstuffs by means of a coupled enzyme Jaffe colour test on a microscale. *Deutsche Lebensmittel-Rundschau* 83(1); 1987; 4-7 (De).

By combining the optimized Jaffe reaction with an enzyme substrate conversion, one can, in a very simple way, identify the actual total creatinine without previous hydrochloric acid treatment and without any derangement through other "Jaffe active" substance. The accuracy of this method is documented through comparative HPLC measuring of homogeneous non-commercial analyzing solutions. AS

Beef

- 152 Kirton (AH), Feist (CL), Duganzich (DM), Jordan (RB), O'Donnell (KP) and Woods (EG). Use of the Hennessy grading probe (GP) for predicting the meat, fat and bone yields of beef carcasses. *Meat Science* 20(1); 1987; 51-63

Bovines

- 153 Cooke (M). Separation of vertebral epiphyses in bovine carcasses. *Meat Science* 20(1); 1987; 19-23

Bulls

- 154 Miller (MF), Cross (HR) and Crouse (JD). Effect of feeding regimen, breed and sex condition on carcass composition and feed efficiency. *Meat Science* 20(1); 1987; 39-50

This study was conducted to evaluate two different feeding system, four breed types and two sex classes to determine their effect on feed efficiency, carcass composition, and sensory properties. Results suggested that bulls should be removed immediately postweaning and placed in the feed lot on a high energy regimen until slaughter at no later than 12 to 14 months of age. MVG

Pork

Pigs

- 155 Warriss (PD) and Brown (SN). The relationships between initial pH, reflectance and exudation in pig muscle. *Meat Science* 20(1); 1987; 65-74

Meat products

- 156 Janssen (FW), Voortman (G) and de Baaij (JA). Detecting of wheat gluten, whey protein, casein, ovalbumin, and soy protein in heated meat products by electrophoresis, blotting, and immunoperoxidase staining. *Journal of Agricultural and Food Chemistry* 35(4); 1987; 563-567

A method is reported by which it is possible to detect several nonmeat proteins in a heat-processed meat matrix. The proteins were extracted with a buffer containing sodium dodecyl sulphate, and aliquots of the extract were subjected to electrophoresis on a polyacrylamide gradient gel. The separated proteins were blotted on a nitrocellulose foil, and the nonmeat proteins were subsequently stained with a selective immunoperoxidase staining system. In model meat products, which had been heated up to 100 °C, detection of soy protein, whey protein, caseinate, egg albumin, and wheat gluten was possible down to the 0.1% level. The method provides a high level of information regarding the identity of the nonmeat protein under investigation. Screening the samples by a dot blot procedure proved to be an efficient way of sorting out samples that do not contain nonmeat proteins, thereby reducing labour costs. AS

Poultry

- 157 Waggoner (TB) and Bowman (MC). Spectrofluorometric determination of BAY Vp 2674 residues in poultry tissues. *Journal of the Association of Official Analytical Chemists* 70(5); 1987; 813-818

A first tissue monitoring method for a 3-quinolinecarboxylic acid residue in poultry is reported. A simple clean up of the initial extract by partitioning above and subsequent direct measurement by fluorescence allow a rapid analysis. Further cleanup and measurement by LC with either ultraviolet or fluorescence detection provide versatility and specificity to the method. MVG

Chickens

- 158 Kondaiah (N), Panda (B) and Anjaneyulu (ASR). Evaluation of type and level of fat in chicken sausage from spent hen meat. *Indian Journal of Poultry Science* 22(1); 1987; 30-34

Effect of type and level of chicken-fat, mutton fat, vegetable fat and a combination of chicken fat and vegetable fat on the quality and acceptability of chicken sausages from spent hen meat was studied. In general, cooking loss and fat separation increased with increase in level of fat incorporation and sensory scores decreased. Chicken sausages with chicken fat were found to be more acceptable compared to mutton fat or vegetable fat or a combination of chicken fat and vegetable fat. Chicken sausages containing 15% level of added fat showed less fat separation resulting in lower cooking loss and were found to have better firmness and overall acceptability scores. AS

Broilers

- 159 Anand (SK), Verma (SS), Pandey (NK) and Mahapatra (CM). A note on incidence of microflora on freshly dressed poultry. *Indian Journal of Poultry Science* 22(1); 1987; 54-55

Swab samples were taken from the breast, drumstick and underwing portions of freshly dressed broilers and quails. A microbiological analysis was carried out to determine the levels of total viable

bacteria as well as the incidence of potential pathogens. Max. counts were obtained from the under wing samples of both broilers and quails, and min. counts from the drumsticks of both types of birds. There was no noteworthy difference in the bacterial counts obtained from the two types of birds. About 10% of the samples contained a large number of *Staphylococcus aureus*. KMD

Guinea fowl

- 160 Pandey (NK), Sham Sunder (O) and Sadagopan (VR). A study on variations in carcass traits, meat quality and composition of guinea fowls fed different levels of protein and energy. *Indian Journal of Poultry Science* 22(1); 1987; 16-20

Carcass traits, meat quality and composition of 79 Guinea fowls raised from day-old to 10 wk on 5 different combinations of protein (19.79-26.09%) and energy (2537-2800 Kcal) were evaluated at the end of 10th wk. Keets fed high protein and energy diets had significantly higher live wt, shank length, keel-bone length and % eviscerated wt. and lower % giblets wt. than others. Remaining groups did not differ significantly from each other for the above traits. Dietary groups had no significant effect on total protein, ether extract and total ash contents of meat, but % moisture was significantly affected by the above treatments. Results in general, indicated that Guineas fed high protein and energy diets had better carcass characteristics, yields and meat quality than those on low protein and energy diets. AS

Poultry products

Eggs

- 161 Terao (J), Kawanishi (M) and Matsushita (S). Application of high-performance liquid chromatography for the estimation of peroxidized phospholipids in spray-dried egg and muscle foods. *Journal of Agricultural and Food Chemistry* 35(4); 1987; 613-617

High performance liquid chromatography (HPLC) was applied to phospholipids extracted from raw egg and spray-dried egg, fresh and cooked ground beef, and raw, cooked, and salted-dried mackerel (*Colo-labis saira*). On reversed-phase HPLC, stored spray-dried egg, fresh ground beef, and raw fish gave peaks corresponding to standard phospholipids hydroperoxides and were tentatively determined to contain hydroperoxides at the wt. percentage in total phospholipids of around 2.4%, 0.2% and 0.4%, resp. No detectable level of phospholipid hydroperoxides was found in raw egg. Normal-phase HPLC provided an index of the oxidation levels for phosphatidylcholine and phosphatidylethanolamine by detecting at different wavelengths (203, 235 nm). Both HPLC analyses and the concomitant assays of thiobarbituric acid value and carbonyl value indicated that processing and cooking of such foods accelerate the formation of phospholipid hydroperoxides which, however, hardly accumulate during cooking. AS

- 162 Venant (A), Borrel (S), Mallet (J), Van Neste (E) and Cantagrel (M-C). Variation of the organo-chlorine compounds residues contamination in eggs and egg products. *Sciences des Aliments* 7(3); 1987; 399-409 (Fr).

SEAFOODS

- 163 Lalitha (KV), Krishna Iyer (H) and Mahadeva Iyer (K). Comparison of media and methods for the detection and enumeration of *Clostridium perfringens* in seafoods. *Fishery Technology* 24(1); 1987; 62-66

Three direct plating methods, the sulphite-cycloserine (SC) agar, sulphite-polymyxin-sulphadiazine (SPS), agar tryptone-sulphite-neomycin (TSN) agar and two most probable number (MPN) procedures LS medium MPN and iron milk medium MPN were compared for the enumeration of *Clostridium perfringens* in seafoods. Isolates were confirmed as *C. perfringens*. The two MPN procedures compared very well with the three plating media tested with stock culture of *C. perfringens* from our laboratory collection and the reference strain NCIB 6125. But in fish samples, the two liquid media (LS and iron milk) were found to be more sensitive and hence the procedure using LS medium for the detection of *C. perfringens* in seafoods is suggested. AS

- 164 Veena (KM). Irradiation, a preservation method for marine products. *Seafood Export Journal* 19(12); 1987; 17-19, 21-22

Covers information relating to preservation of fish and shell fish products by means of irradiation. The dosages to be used, the safety measures to be employed, the regulations regarding good manufacturing practices, installation of irradiation centres, labelling, and re-irradiation have been summarized. The scope for export of irradiated marine products has been examined. KMD

Crabs

- 165 Chinnamma George) and Gopakumar (K). Biochemical studies on crab *Scylla serrata*. *Fishery Technology* 24(1); 1987; 57-61

Biochemical composition of body meat of crab (female) with (i) carrying eggs and (ii) without egg and also the composition body meat and claw meat are given. Meat content of (i) is 21.9% and (ii) is 26.4%. (i) contained 19.16% protein and (ii) 20.92% protein. Body meat and claw meat of crab differ in proximate composition, protein fractions, minerals and free amino acids. Yield is more in claw (42-47.3%) than in crab (23.6-36.0%) meat. Water content (82.94%) is more in claw meat and much variation is not found in protein, lipid or ash contents in both. P, K, and Ca are slightly higher in body meat but Na is extremely higher in claw meat. Composition of the claw juice indicates that about 21% of the whole wt. of claw is liquid. The extractability of N constituents in Dyer's buffer are 97.70 and 90.60% and non-protein N 27.34 and 26.71% in body meat and claw meat resp. Sarcoplasmic protein is more in body meat (33.33%) than the myofibrillar protein in claw meat (58.98%). In both body meat and claw meat glycine-alanine constitute the major amino acid pool (82.4 and 52.5% resp.). Other major amino acids in body meat are lysine (4.1%) aspartic acid (3.1%) and histidine (2.28%). In claw meat lysine is 19.1%, valine 5.0%, histidine 4.3% leucine and phenylalanine 3.5% each. KAR

Fish

- 166 Basu (S), Ima Khasim (D) and Srinivasa Rao (P). Comparative efficiency of different surfaces for drying fish. *Fishery Technology* 24(1); 1987; 37-40

Four drying surfaces (cement platform, palmyrah leaf mat, aluminium tray and stretched net) were tried for drying of *Sciaenids* *Johnius dussumieri*, mullet *Mugil kelaarti* and perch (*Mullidae*). All surfaces were found equally efficient. The cheaper and locally available palmyrah leaf mat or stretched net can be used in place of the other two for efficient drying. KAR

- 167 Belleau (L) and Simard (RE). Effects of carbon dioxide and nitrogen on fish fillets. *Sciences des Aliments* 7(3); 1987; 433-446 (Fr).
- 168 Obanu (ZA). Use of simple fat analysis for evaluating quality changes in intermediate moisture fish stored at tropical temperature. *Fishery Technology* 24(1); 1987; 31-36

Fresh water fishes (i) *Chrysichthys nigrodigitatus*, (ii) *Bagrus docamac* and (iii) *Eutropius niloticus* were used. The intermediate moisture (IM) fish were packaged separately in polythene bags and analysed at 3 wk intervals over 12 wk period at 38 Degree C for moisture, pH, acid value, peroxide value, and thiobarbituric acid value (TBA). In IM (iii) moisture retention was best within the first 6 wk of storage while (i) had the worst moisture retention. (iii) also contained highest initial fat. The pH of (i) and (iii) declined from prestorage values of 6.75, 6.60 and 6.20 at 9 wk resp. While (ii) showed the highest and fastest free acid production. Peroxide formation was slow in the first 3 wk, increased steadily afterwards upto the end of the storage. TBA increased attaining peak values at 9 wk for (i) and (iii) and 6 wk for (ii); thereafter all values declined fast. MVB

- 169 Vicaor Raj (CM) and Chandrasekhar (TC). High temperature processing of fish sausage. III. Studies on some of the storage characteristics. *Fishery Technology* 24(1); 1987; 48-53

Quality changes occurring in high temp. (115.6 C for 20 min) processed fish sausage during storage for 13 days were studied. The fish sausage had a proximate composition (in %) of 14.56 protein, 4.65 fat, 69.14 moisture, 2.12 ash and 8.12 carbohydrate. Changes in physical, chemical and microbiological parameters were observed to assess the quality of the stored product. Results of different tests such as pH, volatile base N (VBN), trimethyl amine N (TMA-N) and jelly strength are discussed. The total bacterial load increased gradually during storage but was not proportional to the initial load. MVB

Lizard fish

- 170 Yasui (A) and Lim (PY). Changes in chemical and physical properties of lizard fish meat during ice and frozen storage. *Journal of Japanese Society of Food Science and Technology* (Nippon Shokuhin Kogyo Gakkaishi) 34(1); 1987; 54-60

In order to prolong the shelf-life of lizard fish meat, effects of removal of trimethylamine oxide (TMAO) from the meat by leaching and storage temp. were studied. TMAO in the non leached minced meat was converted into formaldehyde (FA) and dimethylamine (DMA) rapidly during ice storage, while viscosity of meat sol and salt-soluble protein extractability (SSP ext.) decreased rapidly. TMAO in the minced meat was almost washed out by two or three times leaching with 4 volumes of leaching solutions to the meat wt. The leached minced meat could keep high viscosity of meat sol in ice storage for a long time. In -10 to -20 C storage viscosity of meat sol in the non-leached and leached minced meat decreased because of freezing denaturation of SSP. The production of FA in the non-leached minced meat was much more in

ice storage than in -10 C storage. In -80 to -60 C storage, both non-leached and leached minced meat could keep high viscosity of meat sol. AS

Fish products

Salami

- 171 Campanini (M), Mutti (P) and Previdi (MP). Characterization of micrococccaceae isolated from raw fermented sausages. *Industria Conserve* 62(1); 1987; 3-6 (It).

62 strains of Micrococccaceae isolated from raw fermented sausages (salami and coppa) could be classified as staphylococci; 78% of them were found to belong to the species *Staphylococcus xylosus* type 2, 5% to the species *S. saprophyticus* and the remaining ones were not comparable with any known species. All staphylococci studied grew at 5Degree C; at this temp. 95% of the isolates also grew in the presence of 15% NaCl. 80% of the staphylococci proved lipolytic at 25 C. and 71% also at 15 C. AS

Mussels

- 172 Favretto (L), Gabrielli Favretto (L) and Felician (L). Principal component analysis for the identification of pollution sources in mussel survey by trace metals. *Zeitschrift fur Lebensmittel-Untersuchung und -Forschung* 184(2); 1987; 101-109

Principal component analysis has been applied to study the multidimensional distribution of 8 trace metals (Mn, Co, Ni, Cu, Zn, Cd, Hg, Pb) which are present in the soft part of mussels (*Mytilus galloprovincialis* Lamarck), in order to clarify the origin of the trace metals from among possible sources. The origin of trace metals in the soft part of mussels from the Gulf of Trieste is discussed. BV

Prawns

- 173 Chakrabarti (R) and Chaudhury (DR). Advantages of liquid nitrogen freezing of *Penaeus monodon* over conventional plate freezing. *Fishery Technology* 24(1); 1987; 44-47

In liquid N frozen the drip loss is considerably less and more of salt soluble protein than in plate frozen. Moisture retention and adenosine monophosphate in liquid N frozen product was more than that in plate frozen products. Liquid N frozen products are biochemically and organoleptically superior to conventional plate frozen products; but beneficial effect of liquid N freezing over conventional plate freezing can exist only upto 59 days at a commercial storage temp. of -18 C. KAR

- 174 Mathen (C) and Thomas (F). Water imbibition and thawing losses from frozen prawn meat. *Fishery Technology* 24(1); 1987; 54-56

Unwashed and uniced meat was frozen at -30 C and thawing losses were studied during frozen storage and compared with those of washed prawn *Penaeus indicus* meat. The frozen prawns were stored at -23 C and analysed after 3, 10, 60, 120 and 180 days. Thawing loss was nil in unwashed samples after 3 days of storage and it gradually increased to 6.6% after 6 months as compared to 6.0 and 18.2% resp. in the washed samples. It was assumed that high thawing losses occurring in commercial frozen prawn meat immediately after freezing may be due to effect of water imbibed during prefreezing stages. In washed samples

textural changes in the cooked product was more, indicating that water washed out of the tissue play an important role in textural changes in prawn meat during frozen storage. MVG

Squids

- 175 Jose Joseph), Prabhu (PV) and Madhavan (P). Utilisation of squid waste as meal. *Fishery Technology* 24(1); 1987; 41-43

The waste, which includes head, tentacles, viscera, fin, skin, and pen, is boiled in salt solution (2%) and alum (0.5%) solution and water for 2 min, drained and dried. All dried samples were analysed for physical and biochemical changes. Blanching, compared to non blanching reduced the yield but in the former drying was quick. The volatile bases were reduced and the colour improved. Pulverisation before drying yielded a granular product; blanching made pulverisation easy. MVG

PROTEIN FOODS

- 176 Hofvander (Y) and Underwood (BA). Processed supplementary foods for older infants and young children, with special reference to developing countries. *Food and Nutrition Bulletin* 9(1); 1987; 1-7

Covers definitions, proposed model for feeding of supplementary foods, raw material used in supplementary foods, nutritional considerations in the formulation of supplementary foods (energy, density, protein and fibre), vitamins and minerals (minimum adequate daily intakes and maximum safe daily intakes) processing, preparation for use, hygiene and packaging and labelling. BV

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Alcoholic beverages

Beer

- 177 Bilinski (CA), Russell (I) and Stewart (GB). Applicability of yeast extracellular proteinases in brewing: Physiological and biochemical aspects. *Applied and Environmental Microbiology* 53(3); 1987; 495-499

A general screening survey for expression of extracellular acid proteinase production was performed on over 100 cultures belonging to the genus *Saccharomyces*. Although two strains of *Saccharomyces cerevisiae* showed positive extracellular proteinase phenotypes in plate tests, it was not possible to demonstrate proteolytic activities in cell-free culture supernatants in assays performed at beer pH values. Of several yeasts from other genera examined, *Saccharomycopsis fibuligera* and *Torulopsis magnoliae* produced extracellular proteinases with desirable properties. Proteolytic activities were detected in assays performed at beer pH values and at lower temp. Brewer's wort served as a highly inducing medium for extracellular proteinase production, with *T. magnoliae* yielding enzyme of highest specific activity. In fact, commencement of enzyme production was detected shortly after the onset of exponential growth in brewer's wort inclusion of crude enzyme preparations in brewer's wort inoculated simultaneously with brewer's yeast reduced final ethanol yields slightly and was found to be effective in reducing chill haze formation in bottled beer. AS

Brewing

- 178 Russell Davis (C). Modern filtration technology for Brewing: The theory and practice of cross-flow filtration. *Brewers' Digest* 62(8); 1987; 34-36, 43

Cross-flow filtration is utilized extensively in many areas of food processing and also for recovery of chemical substances to waste water treatment to water reclamation. In breweries it offers new possibilities for filtration unit operation. Filtered beer can be sterile filtered via cross flow filtration. Beer can be recovered by concentrating waste yeast to produce a blendable beer and higher solids yeast by-product clear extract can be recovered from trub while reducing the volume of material sent to spent grains. BV

Wines

- 179 Coniak (OJ) and Noble (AC). Sensory study of selected volatile sulphur compounds in white wine. *American Journal of Enology and Viticulture* 38(3); 1987; 223-227

Odour thresholds in white wine of dimethyl sulphide(DMS), dimethyl disulphide(DMDS) and ethanethiol (ETH) was studied. In addition specific aromas of DMS and ETH were characterised by descriptive analysis. MVG

- 180 Grossmann (M), Rapp (A) and Rieth (W). An enzymatic way to set free compounded flavouring substances in wine. *Deutsche Lebensmittel-Rundschau* 83(1); 1987; 7-12 (De).

- 181 Guinard (JX) and Cliff (M). Descriptive analysis of Pinot Noir wines from Carneros, Napa, and Sonoma. *American Journal of Enology and Viticulture* 38(3); 1987; 211-215

The technique of descriptive analysis as applied to compare sensory properties of Carneros Pinot Noir wines and Pinot Noir wines from the Napa and Sonoma areas(excluding Carneros) has been described. MVG

- 182 Ingledew (WM), Magnus (CA) and Sosulski (FW). Influence of oxygen on proline utilization during the wine fermentation. *American Journal of Enology and Viticulture* 38(3); 1987; 246-248

This research was directed towards the identification of conditions under which protein would be available to the growing yeast in initial stages of fermentation. MVG

- 183 Klingshirn (LM), Liu (JR) and Gallander (JF). Higher alcohol formation in wines as related to the particle size profiles of juice insoluble solids. *American Journal of Enology and Viticulture* 38(3); 1987; 207-210

Juice insoluble solids may contain a range of particle sizes, this study was undertaken to determine size distribution (profiles) in three sediment layers of juice. The relationship between particle size of insoluble solids and higher alcohol formation was also investigated. MVG

- 184 Ludemann (A). Wine clarification with a crossflow microfiltration system. *American Journal of Enology and Viticulture* 38(3); 1987; 228-235

- 185 Ohkubo (T) and Ough (CS). An analytical survey of four California varietal white table wines. *American Journal of Enology and Viticulture* 38(3); 1987; 171-175

Four major white varietal table wines were surveyed for composition and quality and statistically evaluated to determine the differences associated with them. MVG

- 186 Puech (J-L). Extraction of phenolic compounds from oak wood in model solutions and evolution of aromatic aldehydes in wines aged in oak barrels. *American Journal of Enology and Viticulture* 38(3); 1987; 236-238

The study is concerned with the extraction of lignin and its degradation products by hydroalcoholic solution. In addition, two Bulgarian wine types, aged in oak barrels and stored in concrete tanks were tested and their vanillin and syringaldehyde contents were examined. MVG

- 187 Riedel (HR). Wine gums-well proven recipes and processing. *Confectionery Production* 53(6); 1987; 474-476

- 188 Spayd (SE), Nagel (CW) and Hayrynen (LD). Effect of freezing fruit on the composition of musts and wines. *American Journal of Enology and Viticulture* 38(3); 1987; 243-245

The changes in must and wine quality due to freezing and thawing fruit from three white wine cvs were studied. MVG

- 189 Yokotsuka (K) and Singleton (VL). Interactive precipitation between graded peptides from gelatin and specific grape tannin fractions in wine like model solutions. *American Journal of Enology and Viticulture* 38(3); 1987; 199-206

Effect of mol. size in both the peptide and phenolic fraction as they interact and precipitate under various conditions pertinent to wine. The tannins used were from grape seeds and therefore, native to wine. MVG

Non-alcoholic beverages

Cocoa

- 190 Knezevic (G). Heavy metals in foodstuffs. Part 5. Cobalt contents in raw cocoa and in finished cocoa products. *Deutsche Lebensmittel-Rundschau* 83(1); 1987; 16-17 (De).

Cobalt contents of raw cocoa and its finished products were analysed by graphite-tube oven technique. The cobalt content increases with an increasing percentage of cocoa in the cocoa products. BV

Coffee

- 191 Greger (JL) and Emery (SM). Mineral metabolism and bone strength of rats fed coffee and decaffeinated coffee. *Journal of Agricultural and Food Chemistry* 35(4); 1987; 551-556

The effect of ingestion of nutritionally complete diets with 6.6% coffee or 6.6% decaffeinated coffee on growth, mineral metabolism, haematological status and bone strength of weanling rats and anemic young rats have been studied. The results showed that rats fed coffee had elevated concn. of iron in their livers, kidneys etc and

higher iron absorption than control rats. Similarly rats fed coffee had elevated liver copper levels and higher tibia concn. of zinc, calcium, magnesium, and phosphorus. Rats fed decaffeinated coffee also had higher zinc tibia levels and these differences in bone mineral levels had no relation to differences in bone strength and elasticity. NGKR

- 192 Hischenhuber (C) and Stijve (T). Determination of benzo(a)pyrene in roasted coffee and coffee brews by HPLC with fluorescence detection. *Deutsche Lebensmittel-Rundschau* 83(1); 1987; 1-4

Roasted coffee was found to contain levels from 0.1 to 3.0 $\mu\text{g}/\text{kg}$ b(a)p, while the concn. in the brews were all below 10 ng/l beverage, i.e. close to the detection limit. When fortifying roasted coffee with known amounts of b(a)p and subsequently analysing the resulting grounds and brews, an extraction yield of about 1% could be calculated. This means, that under the applied conditions of coffee brewing, the complex formation of caffeine with b(a)p, which increases its solubility in water does not play an important role. Even consumption of brews, prepared from strongly contaminated beans, should therefore, hardly influence the daily intake of carcinogenic b(a)p. The analytical method applied consisted of a simple extraction and clean-up procedure, involving saponification, liquid-liquid partition, and column chromatography, followed by reversed-phase high performance liquid chromatography with fluorescence detection. AS

- 193 Kruijf (N), Schouten (T) and van der Stegen (GHD). Rapid determination of benzo (a) pyrene in roasted coffee and coffee brew by high-performance liquid chromatography with fluorescence detection. *Journal of Agricultural and Food Chemistry* 35(4); 1987; 545-549

A rapid method by HPLC determination of trace quantities of benzopyrene in roasted coffee, spent coffee and coffee brew has been developed and details are presented in this paper. Different extraction methods were followed and benzopyrene levels in 55 roasted coffee samples ranged from not detectable to 0.5 $\mu\text{g}/\text{kg}$. The brews yielded benzopyrene content of approx. 1 ng/L indicating yields of about 1% for both preparation methods. NGKR

- 194 Menon (SN), Gangadhar (R) and Manoharan (K). Indian robusta coffee: Its flavour profile. *Indian Coffee* 51(8-9); 1987; 11-14, 18

This is a general article describing the origin of Indian Robusta coffee, area under cultivation, harvesting, processing, grading, and marketing. Certain quality specifications and standards are also reported. There is no substantial information on the flavour profile, despite the claim in the title of the paper. KMD

- 195 Pettitt (BCJr). Identification of the diterpene esters in Arabica and Canephora coffees. *Journal of Agricultural and Food Chemistry* 35(4); 1987; 549-551

The distribution of the fatty acids esters of cafestol and Kahweol was determined in a series of Arabica and Canephora coffee beans. The results showed that there is no var. between the varieties and the majority of the esters are kahweol derivatives, Cafestol as palmitate and another diterpene in Canephora identified as 16-methoxy cafestol. NGKR

Fruit juices

- 196 Thiery (Y). Aseptic filling of fruit juice in glass bottles. *Flussiges Obst* 54(2); 1987; 61-62

Describes a special filler for aseptic filling of fruit juices into glass bottles based on the principle of wt. control. The products will flow into the bottle by means of gravity. This system allows to dose the exact quantity of product in the bottle. The dosing valve is never in contact with the product, the neck of the bottles never touches the filling nozzles. BV

Citrus juices

- 197 Maeda (H). Studies on the production of high quality citrus juices by resin adsorption methods. *Flussiges Obst* 54(2); 1987; 65-66

In this study a method for removal of naringin which is one of the bitterness components in Natsudaiddai (*Citrus natsudaiddai hayata*) juice was examined to utilize late ripening citrus fruit for soft drinks. Additionally changes in naringin, limonoid and others of the bitterness components were studied during the processing of Hassaku L (*Citrus hassaku hort. ex Tanaka*) juice. Adsorption of the bitterness components and reduction of acidity in Natsudaiddai juice, removal of the bitterness components and the reduction of acidity in Hassaku juice, removal of hesperidin in Satsuma mandarin juice with adsorbents, removal of the flavour components in Satsuma mandarin juice with ion exchange resins and recovery of syrups from press liquid of Satsuma mandarin peel residue with ion exchange resins and adsorbents are the aspects covered. BV

Grape juices

- 198 Strauss (CR), Gooley (PR), Wilson (B) and Williams (PJ). Application of droplet countercurrent chromatography to the analysis of conjugated forms of terpenoids, phenols, and other constituents of grape juice. *Journal of Agricultural and Food Chemistry* 35(4); 1987; 519-524

Minor polar constituents isolated from juices of the *Vitis vinifera*, cv. Rhine Riesling, Muscat of Alexandria, and Chardonnay, were separated by droplet countercurrent chromatography (DCCC). Analyses were made of compounds in the DCCC fractions by GC-MS after enzymic hydrolysis and by NMR after acetylation and further liquid chromatography. These procedures have allowed identification of conjugated forms, including glycosides, of monoterpenoids, C₁₃ norisoprenoids, phenols, and other compounds. Among the grape constituents identified were (E)-6,7-dihydroxy-2,6-dimethylocta-2,7-dien-1-yl-β-D-glucopyranoside and the corresponding 6-O-β-arabinofuranosyl-β-D-glucopyranoside, 1-methyl-1-(trans-5'-methyl-cis-5'-vinyletetrahydrofuran-2'-yl)ethyl-6-O-β-arabinofuranosyl-β-D-glucopyranoside, astilbin, quercetin-3-O-β-glucopyranoside and roseoside. Additionally, conjugates of (E)-2,6-dimethyl-octa-3,7-diene-2,6-diol, (E)-2,6-dimethyloct-7-ene-2,6-diol, (E)-9-hydroxymetgastima-4,7-dien-3-one, (E)-3-hydroxymegastigma-5,8-dien-7-one, zingerone, 4-(4-hydroxy-3-methoxyphenyl)butan-2-ol, and 3-(4-hydroxy-3-methoxyphenyl)propan-1-ol, 2-(4-hydroxy-3-methoxyphenyl)ethanol, methyl vanillate, cinnamyl alcohol, and 3-phenylpropan-1-ol were found. The work demonstrates that DCCC will facilitate separation and analysis of polar, nonvolatile constituents of grapes, including precursors of volatile flavorants. AS

Orange juices

- 199 Doner (LW), Ajie (HQ), Sternberg (LSL), Milburn (JM) DeNiro (MJ), Hicks (KB). Detecting sugar beet syrups in orange juice by D/H and 18 /16 *Journal of Agricultural and Food Chemistry* 35(4); 1987; 610-612

A method which permits identification of orange juice samples to which added sugar beet invert syrups has been described in this paper. This method is based on deuterium/hydrogen ratio and 18 /16 ratios in sucrose. This method's viability to detect adulteration of orange juice with beet sugar will provide a disincentive for the economic adulteration of orange juice. NGKR

Phalsa beverage

- 200 Waskar (DP) and Khurdiya (DS). Processing and storage of 'phalsa' beverages. *Indian Food Packer* 41(5); 1987; 7-16

Nectar, conc. squash and crush prepared from phalsa (*Grewia subinaequalis* L.) were stored for 240 days at room temp. (32.42 to 15.46 C) in cool chambers (26.60 to 11.0 C) and in cool store (3 C) after packing in 200 ml glass bottles. The max. retention of anthocyanins was observed in the phalsa beverage stored in cool store followed by storage in cool chamber and at room temp. All the beverages packed in glass containers were acceptable upto 180 days; crush was acceptable up to 240 days in cool store followed by 120 days in cool chamber and 60 days at room temp. VKR

Phalsa syrup

- 201 Waskar (DP) and Khurdiya (DS). Effect of packaging containers on the anthocyanins of 'phalsa' syrup. *Indian Food Packer* 41(5); 1987; 17-23

The effect of different containers on the quality of phalsa (*Grewia subinaequalis* L.) syrup during storage was investigated. The syrup was packed in (i) glass bottles, (ii) PVC, and (iii) HDPE containers and stored separately at room temp. (37.42-15.46 C), in cool chamber (26.60-11.0 Degree C) and in cool store (3 C). Anthocyanins were better retained in (i) followed by (ii) and (iii) at the three storage temp. The syrup could be stored well at low temp. when packed in (ii) and (iii). The syrup packed in (i) was acceptable upto 240 days storage in cool store and 180 days in (ii) and (iii). The syrup remained acceptable upto 120 days in cool chambers and upto 60 days at room temp. in all the three containers. VKR

Soft drinks

- 202 Ceppert (H). Analysis of saccharin in soft drinks with the Specord M40. *Lebensmittelindustrie* 34(2); 1987; 82 (De).

Tea

- 203 Ekanayake (A) and Chandradasa (PB). Observations on the vinification of tea extracts. *Journal of the Science of Food and Agriculture* 41(1); 1987; 87-92

Both clarified and unclarified aqueous tea extracts were subjected to fermentation by *Saccharomyces cerevisiae* var Montrachet and by *Saccharomyces bayanus* after sweetening with sugar to 20° Brix. The theaflavin, caffeine and theobromine levels in the fermenting must fell progressively during a period of 15 wk. The soluble amino acids were reduced by about 90% with *S. bayanus* in 1 wk. in the presence of

added ammonium phosphate. It was found that there was no change in the arubigins and marked astringency development was attributable to changes in the proportions of the soluble tea constituents. It was also observed that a few wk. of racking in barrels made of *Berriya cordifolia* reduced the astringency at the cost of liquor body and also interactions between oxidised polyphenols and proteins/polysaccharides have been observed. NGKR

- 204 Terada (S), Maeda (Y), Masui (T), Suzuki (Y) and Ina (K). Comparison of caffeine and catechin components in infusion of various tea (Green, Oolong and Black tea) and tea drinks. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi') 34(1); 1987; 20-27 (Ja).

The simple method was developed for determining caffeine and catechines in infusion of model manufactured green, Oolong and black tea made by Yabukita var. The caffeine concn. in these infusion was not different but the catechins concn. was different as follows: green tea > Oolong tea is greater than or equal to Black tea. The concn. of catechins Chinese and Taiwan Oolong tea infusion were lower than that in the green tea infusion. Caffeine and catechins components of commercial Oolong tea bag and drinks were different from Oolong leaf tea, and those pattern was similar to the roasted tea infusion. The concn. of catechines in those infusion were less than those of Chinese and Taiwan Oolong leaf tea. AS

FATS AND OILS

Fats

- 205 Arens (M) and Kroll (E). Survey by a working party of the DGF, 98th report: German standard methods for investigation of fats, fatty products and related materials, 75th Report: Analysis of fat raw materials. IX. *FAT Science and Technology* 89(4); 1987; 152-154 (De).
- 206 Buhler (M) and Wandrey (C). Enzymatic fat splitting *FAT Science and Technology* 89(4); 1987; 156-164 (De).

Under technically relevant conditions a conversion of at least 95% is achieved for soybean or olive oil by enzymatic fat-splitting in a stirred tank-reactor on a laboratory scale. The concn. of glycerol in water is influenced by the ratio of the fat and water phase and turns out to be of great importance. Among the more than thirty microbial lipases tested, an enzyme from *Candida cylindracea* is most suitable for total hydrolysis. It shows a broad substrate specificity at high specific activity and cleaves all three ester/bonds at similar rates. Technically important fats and oils are also readily accepted as substrates. The influence of the interfacial surface area between oil and water phase is quantitatively measured and interpreted. The rate of hydrolysis is determined during batchwise as well as continuous operation. Under both process conditions severe product inhibition is observed. The thermodynamic and kinetic results indicate that a reactor concept of the counter-current plug-flow type would be most suitable. The stability and the price of the enzyme seem to be the major factors limiting the development of an economic enzymatic fat splitting process. KAR

Sal fat

- 207 Yella Reddy (S) and Prabhakar (JV). Isolation of 9, 10-dihydroxystearic acid from sal (*Shorea robusta*) fat. *Journal of the American Oil Chemists' Society* 64(1); 1987; 97-99

9, 10-Dihydroxystearic acid and its triglycerides (DHS-TGs) were isolated from sal fat by silica gel absorption and solvent and dry fractionation processes, followed by crystallization. Silica gel absorption gave a higher yield of DHS-TGs than the other two fractionation processes. However, the dry fractionation process was found to be comparatively easy to carry out. 9, 10-Dihydroxystearic acid was isolated and identified by TLC, GLC, MP and IR-spectrometry. The DHS-TGs were found to contain 30.5% 9, 10-dihydroxystearic, 57.5% stearic, 6.0% palmitic and 5.8% arachidic acids. These processes were found to be useful for recovery of DHS-TGs and also to improve the solidification properties of sal fat required for confectionery. AS

Oils

- 208 Ahmad (S), Ansari (MH), Ahmad (M) and Osman (SM). Studies on minor seed oils. XII. *FAT Science and Technology* 89(4); 1987; 154-156

Physico-chemical analysis of seven seeds of indigenous species of plants belonging to six different botanical families have been carried out with the help of UV, IR, TLC-GLC techniques. All the seed oils were found in agreement with the simple fatty acid composition i.e. linoleic-oleic-palmitic type. The chief components among unsaturated acids in the six seed oils are oleic and linoleic acids together forming 40.0-86.0%. *Polygonum* sp. surprisingly is found to have combined content of oleic and linoleic acid 13.3% only but having unexpected high amount of linolenic acid (37.8%). Among saturated acids, palmitic acid was predominant acid found in the range of 10.0-48.3%. the chemical screening of seed oils reveals that the species producing highly unsaturated oils merit attention for utilization as minor seed oils. AS

- 209 Karnofsky (G). Design of oilseed extractors. I: Oil extraction (supplement). *Journal of the American Oil Chemists' Society* 64(11); 1987; 1533-1536

This article introduces the concept of parabolic concn. gradient in the flakes and of an apparent diffusivity which is an inherent property of the seed. The method is applied to the solution of several commercially important extractions. BV

- 210 Pfeiffer (HF) and Wust (R). Lipids as release agent components in the food industry. *FAT Science and Technology* 89(4); 1987; 142-146

Technical oils and emulsions are of outstanding importance in many different ways in the processing of food as pan release agents, lubricants for bread cutting machines or separating oils for dried fruit and candy. Since these oils are not intended to become integrated part of the food recipes, even mineral and silicon oils have been used. Nowadays, however, it is becoming increasingly understood that technical oils should have an edible quality. Fat and fatty acid chemistry has various products to meet this demand as well as the necessary technical requirements; good releasing properties, high oxidation and polymerization stability. Low evaporation losses and viscosity values which can be adopted, however, to all possible need.

AS

- 211 Quirin (K-W), Gerard (D) and Kraus (J). Dense gas extraction with carbon dioxide-A method to produce high grade fatty oils under mild conditions. *FAT Science and Technology* 89(4); 1987; 139-142

Mechanical pressing and solvent extraction with hexane are the major classical methods for seed oil recovery. High pressure extraction with carbon dioxide is compared to these methods and the main advantages and disadvantages of the different procedures are discussed. The valuation of the facts leads to the conclusion, that high pressure extraction can be of interest in special fields of fatty oil production. The extraction of maize germs, linseed, evening primrose seeds and jojoba fruits are described as examples. Experimental data of high pressure extraction and a short characterization of the products are given. AS

- 212 Sebedio (JL), Le Quere (JL), Semun (E), Morin (O), Prevost (J) and Grandgirard (A). Heat treatment of vegetable oils. II. GC-MS and CC-FTIR spectra of some isolated cyclic fatty acid monomers. *Journal of the American Oil Chemists' Society* 64(9); 1987; 1324-1333

Gas liquid chromatography coupled with mass spectrometry (GC-MS) showed that the cyclic fatty acid monomers (CFAM) isolated from a heated linseed oil have two ethylenic bonds, while the CFAM isolated from heated sunflower oils were saturated and monethylenic isomers. GC-MS studies also showed the presence of cyclohexenic derivatives in the case of linseed oil. GLC coupled with Fourier transform infrared spectrometry (GC=FTIR) studies indicated that the CFAM isolated from linseed oil were of cis(Z) trans(E) structures except two components which were cis, cis (Z,Z) dienoic acids. The unsaturated CFAM isolated from sunflower oils were cis(Z) and trans (E) monothylenic isomers. For sunflower oils, the major CFAM were isomers having a cis (z) ethylenic bond. The saturated CFAM isolated from a heated sunflower oil had mol. wt. of 296 and 294. The latter could correspond to some bicyclic isomers. AS

Cottonseed oils

- 213 Ramos (LCdaS) and Kohel (RJ). Seed-oil content of glanded and glandless cottons. *Journal of the American Oil Chemists' Society* 64(9); 1987; 1337-1340

The genetic aspects of glanded and glandless cottonseed oil was studied in order to improve seed oil content and because it would be possible to save one generation(season) or half the number of crosses, if reciprocals could be eliminated. MVB

Essential oils

Lime oils

- 214 Clark (BCJr), Chambles (TS) and Iacobucci (GA). HPLC isolation of the sesquiterpene hydrocarbon germacrene B from lime peel oil and its characterization as an important flavour impact constituent. *Journal of Agricultural and Food Chemistry* 35(4); 1987; 514-518

In this study a semi preparative normal phase HPLC method using three silica columns in tandem and elution with hexane at room temp. has been carried out. This method permits efficient detn. of GLC and MS data on the collected fractions. The sesquiterpene has been identified by a var. of spectroscopic techniques and confirmed by synthesis to be germacrene B(1). This fraction represents about 0.35% of the whole oil and has all the typical characteristics of the lime peel

oil. NGKR

Orange oils

- 215 Gaydou (EM), Bianchini (J-P) and Randriamiharisoa (RP). Orange and mandarin peel oils differentiation using polymethoxylated flavone composition. *Journal of Agricultural and Food Chemistry* 35(4); 1987; 525-529

Six citrus methoxy flavones have been separated and quantitatively determined by normal phase HPLC. The methoxy flavone composition of peel oils was determined for 15 various samples obtained from mandarins and oranges with a UV detector at 280 nm. The major components were found to be tangeretin ($0.5-2.8 \text{ g L}^{-1}$), heptamethoxyflavone ($0.2-2.7 \text{ g L}^{-1}$) and nobiletin ($0.4-2.0 \text{ g L}^{-1}$). The six flavones and the sum of flavones were used in standardised principle component analysis for the sample classification. NGKR

Palm oils

- 216 Martinenghi (GB), Motta (L) and Grieco (D). About palm oil processing: Influence of pretreatments on fractionation. *Industrie Alimentari* 26(4); 1987; 349-353

Palm oil with 5% initial acidity and 8% diglycerides, indicated a good yield of neutral liquid fraction. Lipid at 19 °C. can be obtained by drastic degumming, neutralisation with NaOH, speedily thermal bleaching, at 240-260 °C under vacuum, filtration at 100-120 °C with a little bleaching earth dry fractionation, deodourization of the two fractions. The presence of diglycerides did not affect notably the crystallization behaviour. BV

Rice bran oils

- 217 Holla (KS) and Press (RR). Industrial hydrogenation of rice bran oil, a substitute for tallow. *Journal of the American Oil Chemists' Society* 64(9); 1987; 1334-1336

The Indian soap industry's hard fat requirement was met until recent years by imported animal tallow. The search for alternate hard fats, consequent to the ban on the import of animal tallow, in 1983, led to realization of the striking similarity in the fatty acid composition of mutton tallow and hydrogenated rice bran oil, except for the trans oleic acid content. This paper traces the course of compositional changes undergone by rice bran oils during industrial hydrogenation, employing gas liquid chromatography and infrared spectroscopy. AS

- 218 Takano (K), Kamoi (I) and Obara (T). Purification and properties of rice bran phospholipase D. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi') 34(1); 1987; 8-13 (Ja).

Phospholipase D (phosphatidylcholine phosphatidohydrolase, EC 3.1.4.4.) extracted from rice bran was purified by precipitation with ammonium sulphate and column chromatographies on n-decylamine sepharose 4B, DEAE-cellulose, Chromatofocusing and TOYOPEARL HW-55F with an overall recovery of 2.3% and 305-fold increase in specific activity. The mol. wt. and the isoelectric point of rice bran phospholipase D were estimated to be about 160,000 and pH 4.9, resp. The enzyme had optimum pH 5.5 and showed the highest activity at 37 °C. There was an obligatory requirement of calcium ion for phospholipase D activity.

Forty mM calcium was essential for maximal activity. The enzyme activity was inactivated by Cu^{2+} , Al^{3+} , P-chloromercuribenzoic acid and moniodoacetic acid. K_m and V_{max} for phosphatidylcholine of the enzyme were estimated to be 7.14×10^{-3} M and 2.2×10^{-5} M/min. Mg resp. AS

- 219 Takano (K), Kamoi (I) and Obara (T). Purification and properties of rice bran phospholipase C. *Journal of Japanese Society of Food Science and Technology* (Nippon Shokuhin Kogyo Gakkaishi) 34(1); 1987; 1-7 (Ja).

Phospholipase C (phosphatidylcholine cholinephosphohydrolase EC 3.1.4.3) extracted from rice bran was purified by precipitation with ammonium sulphate and column chromatographies on n-decylamine-Sepharose 4B, DEAE-cellulose, TOYCEPEARL HW-55F and polyacrylamide disc gel electrophoresis with an overall recovery of 1.4% and 357 fold increase in specific activity. The mol. wt. and the isoelectric point of rice bran phospholipase C were estimated to be about 160,000 and pH 4.3 resp. The enzyme had optimum pH of 9.5 to 10.0 and showed the highest enzyme activity at 70 °C. The enzyme was stable over the pH range of 7.0-11.0. The enzyme activity was strongly inactivated by EDTA and it again activated by the addition of CO_3^{2-} . K_m and V_{max} for p-nitrophenylphorylcholine of the enzyme were estimated to be 15.3×10^{-3} M and 4.6×10^{-5} M/min mg resp. AS

Soybean oils

- 220 Arkad (O), Wiener (H), Garti (N) and Sasson (Y). Catalytic transfer hydrogenation of soybean oil methyl ester using inorganic formic acid salts as donors. *Journal of the American Oil Chemists' Society* 64(11); 1987; 1529-1532

The hydrogenation of soybean oil methyl esters using aqueous formic acid salts solutions and heterogeneous palladium-on-carbon catalyst was investigated. Complete hydrogenation of the methyl ester was achieved by mixing a concentrated aqueous alkali formate solution with the methyl ester at 80 °C in the presence of the catalyst (0.2-0.4%Pd). At the initial stages of the reaction, the selectivity was significantly higher than conventional hydrogenation (Hydrogenation under pressure) performed with the same catalyst. Cis-trans isomerization was similar to the behaviour of conventional techniques. AS

- 221 Nelson (AI), Wijeratne (WB), Yeh (SW), Wei (TM) and Wei (LS). Dry extrusion as an aid to mechanical expelling of oil from soybeans. *Journal of the American Oil Chemists' Society* 64(9); 1987; 1341-1347

A new concept is described for mechanical extraction of oil from soybean using dry extrusion as a pretreatment. It offers potential for producing natural soybean oil and food grade low fat soy flour by relatively low cost operation. MVG

- 222 Takagi (T), Wakasa (N) and Miyashita (K). Formation of conjugated diene and triene products in lipoxygenase oxidation of C18, C20, C22 PUFAS. *Journal of the American Oil Chemists' Society* 64(9); 1987; 1320-1323

Substrate specificity for the formation of conjugated diene and triene products in the oxidation of series of PUFA by soybean lipoxygenase was studied. There was a lowering of the conjugated diene formation during oxidation by lipoxygenase. It was thought to be caused by further oxidation of conjugated diene monohydroperoxides to yield conjugated triene products. Therefore the conventional lipoxy-

genase method gave erroneous values for cis, cis-methylene interrupted PUFA in oils such as fish oils. However, by raising the pH of reaction mixtures from 9 to 11 the secondary oxidation of conjugated diene monoperoxides was completely inhibited and the PUFA values in fish oils obtained by this improved method were in good agreement with those obtained by a GLC methods. MVG

Sunflower oils

- 223 Rivarola (C), Segura (JA), Anon (MC) and Calvelo (A). Crystallization of hydrogenated sunflower-cottonseed oil. *Journal of the American Oil Chemists' Society* 64(11); 1987; 1537-1543

Crystal structures formed during solidification of hydrogenated cottonseed oil, sunflowerseed oil and their blends were analyzed by using an X-ray diffraction technique, differential scanning calorimetry (DSC) and polarized light microscopy. Temp. and times of crystallization under conditions which tend to produce Beta type structures were determined in terms of refrigeration parameters. Microscopy with polarized light also helped clarify some aspects of the tridimensional network of crystals that contribute to the consistency of products made from hydrogenated oils. AS

SPICES AND CONDIMENTS

Condiments

- 224 Jacobasch (P). Construction of a pilot plant for the manufacture of condiment blends. *Lebensmittelindustrie* 34(2); 1987; 54-55 (De).

Spices

- 225 Gola (S), Manganelli (E), Ambroggi (F) and Castelvetro (F). In vitro sensitivity of some microorganisms to the essential oils of some spices and two aromatic substances. *Industria Conserve* 62(1); 1987; 25-27 (It).

The antimicrobial effect of the essential oils of 9 spices (Cinnamon, cloves, coriander, mustard, nutmeg, oregano, pepper, sage and thyme) and two aromatic substance (eugenol and cinnamic aldehyde) against 9 bacteria and 2 fungi was investigated. The oils of cinnamon, oregano and thyme and the cinnamic aldehyde inhibited all microorganisms, except *L. casei*, at a concn. less than 1000 p.p.m; the oils of coriander, nutmeg, pepper and sage were less inhibitory (1500-15,000 p.p.m). The sensitivity of the microorganisms to each individual oil was related to microorganisms genus and species. BV

Pepper

- 226 Vidal (J-P) and Richard (H). Production of black pepper oleoresin by dense carbon dioxide or carbon dioxide ethanol extraction. *Sciences des Aliments* 7(3); 1987; 481-498 (Fr).

Carbon dioxide are obtained either at different temp. (20 to 50 C) and constant pressure (100 bars) or at constant temp. (30 C) and variable pressure (70 to 100 bars) or at constant temp. and pressure (20 C and 100 bars) with 0.5 to 2.0% ethanol in carbon dioxide. The essential oil composition is determined by mass spectrometry-gas chromatography and quantitative analysis by gas chromatography with an internal standard; the quantitative detn. of piperine is made by spec-

trophotometric absorption at 343 nm. The study of grinding shows that when black peppercorns are ground the recoveries are 16 times higher than with whole peppercorns. The essential oil fraction is best extracted at 80 bars and 30 °C; the extraction level of piperine increase with the carbon dioxide density. The addition of 2% ethanol in carbon dioxide makes it possible to extract 90% of the essential oil and of the piperine. It reduces the carbon dioxide flow and improves the recovery of monoterpene hydrocarbons. At 80 bars, 30 °C and with 2% ethanol in carbon dioxide oleoresin yield of 12.4%. This extract contains 16.7% of essential oil and 42.2% of piperine. It is very close to the one obtained by dichloromethane extraction. AS

Savoury flavours

- 227 David (P). Savoury flavours: From nature to the world of convenience. *Chemistry and Industry* (11); 1987; 386-387

Aspects covered include categories of savoury flavours: ingredients involved in savoury flavours; application of savoury flavours; range of vegetable extracts; application of vegetable extracts and application in convenience foods. BV

SENSORY EVALUATION

Nil

FOOD STORAGE

- 228 Girish (GK). Training programmes in scientific storage of food grains offered by Department of Food, Government of India. *Bulletin of Grain Technology* 25(10); 1987; 70-84

This review covers the various training programmes of scientific storage of food grains offered by Department of Food, Government of India such as training programmes at apex level, long term courses, short term courses, special courses, training programmes at farmer's level, stipendiary and non-stipendiary training courses. This review also covers courses organised by Central Ware Housing Corporation, Food corporation of India etc. NSKR

- 229 Indu Bathla, Miglani (SS), Oberoi (K) and Gupta (JP). A study of grain storage structures and practices in selected villages of Ludhiana district. *Bulletin of Grain Technology* 24(1); 1987; 24-29

The study indicated that 38% of families stored their grains in drums (metal bins), 34% in jute bags, 7% in kacha kothi, 9% in bulk storage in rooms and 6% in pucca kothi and 6% in bharola. 56% families cleaned their grains before storage and 37% families sun-dried the grains once or twice during the storage period. 38 families (of the 100) fumigated their grains with Al. phosphide and 21 families used malathion spray. The wt. loss which occurred due to the consumption of grain by stored grain pest was min. in drum and max. in kacha kothi. It was also shown that fumigation was quite effective in reducing storage losses and the wt. loss was less in the treated grains as compared to the untreated ones and direct relationships was found between moisture content, wt. loss and germination of the stored grains. When moisture increases the wt. loss also increases and germination decreases. NSKR

INFESTATION CONTROL AND PESTICIDES

Infestation control

- 230 Lillie (TH) and Goddard (J). Operational testing of electrocutor traps for fly control in dining facilities. *Journal of Economic Entomology* 80(4); 1987; 826-829

Electrocutor traps equipped with ultraviolet lamps to attract insects are being used with increasing frequency for pest control. The insect activity was monitored by counting number of specimens collected on fly paper active insects observed on tables and counter tops and specimens collected in the electrocutor traps. It was observed when more than 200 house flies were collected in electrocutor traps during each wk that traps were operated. 72% fewer house flies were observed when traps were on than when traps were off. This study showed promise that electrocutor traps would prove efficient pest management devices. NGKR

Bacillus thuringiensis

- 231 Jaquet (F), Hutter (R) and Luthy (P). Specificity of *Bacillus thuringiensis* delta-endotoxin. *Applied and Environmental Microbiology* 53(3); 1987; 500-504

In this study it was brought out that three factors contribute to the potency of *B. thuringiensis* delta-endotoxin the origin of the toxin (Strain) the ability of the gut juice to dissolve the crystals and the intrinsic susceptibility of the insect to the toxin. An optimal relationship, therefore, between the toxin was required for greatest efficacy. MVG

Insects

Callosobruchus chinensis

- 232 Singal (SK), Jaglan (RS) and Chaudhary (SD). Screening of genotypes of hyacinth bean, (*Lablab purpureus*) (L) against pulse beetle *Callosobruchus chinensis* (L.). *Bulletin of Grain Technology* 25(2); 1987; 157-159

Hyacinth bean occupies a special place in dietary schedule in many parts of India. The development of hyacinth bean has been studied and results reported in this paper. It is revealed that genotypes HD-18, Sem 1 x HD-60 and HD-18 x HD-105 the beetle completely failed to develop where as HD-18 x HD-60, HD-18 x HD-22, HD-60 x HD-79, HS-60 x HD-1, HD-13 x HD-67 and HD-19 x HD-44 with 0.38 to 0.84% adult emergence showed partial development of this beetle.

Sitophilus zeamais

- 233 Walgenbach (CA), Burkholder (WE), Curtis (MJ) and Khan (ZA). Laboratory trapping studies with *Sitophilus zeamais* (Coleoptera:Curculionidae). *Journal of Economic Entomology* 80(4); 1987; 763-767

Corrugated cardboard traps were used to test attractive properties combination of synthetic pheromone and various food odours to maize weevils, *Sitophilus zeamais* Motschulsky in laboratory test arenas. The results showed that the maize weevils preferred the isomer of 5-hydroxy-4-methyl-3-heptanone to the other three isomers. Maize

weevils were discarded only when both cracked wheat and (4S, 5R)-Sitophenone were present in the trap. Aging of the weevils slightly reduced the catch. NGKR

Tribolium castaneum

- 234 Sharma (DL), Bedi (SS) and Kaur (P). Effect of electric fields on rust red flour beetle (*Tribolium castaneum* Herbst) Bulletin of Grain Technology 25(10); 1987;

The effect of alternate and direct current of different voltages on the rust red flour beetle (*Tribolium castaneum* Herbst) revealed by statistical tests that the effect of both exposure and frequency are quite significant at 5% level. NGKR

Pesticides

- 235 Cairns (T) and Siegmund (EG). Pesticide confirmation by triple state quadrupole mass spectrometry: Etrinfos and dimethoate. Journal of the Association of Official Analytical Chemists 70(5); 1987; 858-862

Recent incidence in an extract of beans of an organophosphorous pesticide of unknown analytical responses that has been indentified as etrimfnos (O, O-dimethyl-O-6-ethoxy-2-ethyl pyrimidin-4-yl phosphorothioate) was confirmed by collision-actuated dissociation (CAD) experiments. These experiments have passed the way for a detection protocol which was generic daughter ions for identification of phosphorothioates and phosphorodithioates at low p.p.m levels to produce extracts. MVO

- 236 Files (LA) and Winefordner (JD). Feasibility study of constant energy synchronous luminescence spectrometry for pesticide determination: Application to carbaryl, naphthol and carbofuran. Journal of Agricultural and Food Chemistry 35(4); 1987; 471-474

Carbaryl, naphthol and carbofuran pesticides have been determined by applying constant energy synchronous luminescence spectrometry at low temp. This method is found to be inexpensive, selective and sensitive and details are described in this paper giving variety of scan parameters for different insecticides. NGKR

Malathion

- 237 Armstrong (DJ) and Fukuto (TR). Synthesis, resolution and toxicological properties of the chiral isomers of O,S-dimethyl and -diethyl ethylphosphorothioate. Journal of Agricultural and Food Chemistry 35(4); 1987; 500-503

The effect of chirality on the toxicological properties of O,S-dimethyl (1) and O,S-diethyl ethyl-phosphorothioate (2) was determined. The resolved esters were prepared from the respective O-methyl and O-ethyl ethylphosphorothioic acids, and absolute configurations of the esters were assigned by relating them to the known configuration of the resolved acids. The S (-) enantiomers of both 1 and 2 were more acutely toxic and were stronger anticholinesterases than the R (+) enantiomers. No delayed deaths were observed with the resolved compounds, but all treated animals lost wt. of 3-4 days following dosing. AS

Rodenticides

- 238 Saxena (Y). Age related toxicity of two acute rodenticides against *Rattus rattus refuscens*. Bulletin of Grain Technology 25(2); 1987; 176-179

The effectiveness of two acute rodenticides against different age groups of *Rattus rattus refuscens* has been evaluated by conducting laboratory tests. It was observed that the younger rats of 150-180 days were more resistant than the older rats of 240-300 days, during a consumption period of all the three days clearly indicating no bait shyness. The mortality of young rats due to silmurin was 80-90% and 90-95% incase of *Abrus precatorius* whereas the mortality of older rats was 92-100% and 96-100% resp. in less time. NGKR

- 239 Sharma (PP). Toxicity of vacor(RH-787) to house rat, *Rattus rattus refuscens*. Bulletin of Grain Technology 25(1); 1987; 17-27

A new class of highly promising rodenticide known as VACOR (RH-787) chemically N-3-pyridimethyl-N-P-nitro-phenylurea is regarded a single dose rodenticide. Investigations were undertaken to find out a suitable vacor bait and its bait shyness to house rat in addition to its toxic effects on body and organ wt. blood, liver and intestine of the rat i.e. partial paralysis of hind legs, vomiting and breathing difficulty. The results revealed that the lethal dose (LD 50) of vacor for the house rat was found to be 30 mg/kg body wt. with the help of stomach tube by force oral feeding method. The histopathology of liver and intestine and haematology of the rat treated with sub-lethal dose of vacor (LD 50) have also been studied and showed that vacor is found to be highly toxic against house rats. NGKR

BIOCHEMISTRY AND NUTRITION

Biochemistry

Vitamins

- 240 Amin (M) and Reusch (J). High-performance liquid chromatography of water-soluble vitamins: Part 3. Simultaneous determination of vitamins B₁, B₂, B₆, B₁₂ and C, Nicotinamide and folic acid in capsule preparations by ion-pair reversed-phase high-performance liquid chromatography. Analyst 112(7); 1987; 989-991

TOXICOLOGY

- 241 Dabeka (RW) and Lacroix (GMA). Total arsenic in foods after sequential wet digestion, dry ashing, coprecipitation with ammonium pyrrolidine dithiocarbamate, and graphite-furnace atomic absorption spectrometry. Journal of the Association of Official Analytical Chemists 70(5); 1987; 866-870
- 242 Wratten (SJ), Fujiwara (H) and Solsten (RT). Properties and decomposition of 2,6-diethylnitrosobenzene. Journal of Agricultural and Food Chemistry 35(4); 1987; 484-491

The properties of 2,6-diethyl nitrosobenzene, proposed as a

toxic metabolite of 2,6-diethylaniline was shown to decompose rapidly in solution or during GC analysis. Methods that depend on GC separations are not appropriate especially because the extensive decomposition of the above compound during the analysis produces substances that are isomeric with the above resulting in possible misinterpretations even when GC/MS used. A group of related compounds were synthesized and used to identify the thermal decomposition products of the above based on their spectral and chromatographic properties. The major compounds identified are N-(2,6-diethylphenyl)hydroxylamine and 3-methyl-7-ethylantranil, whose structures were confirmed by synthesis as an unusually substituted azobenzene derivative. NGKR

Bacteria

Clostridium botulinum

- 243 Carpenter (CE), Reddy (DSA) and Cornforth (DP). Inactivation of clostridial ferredoxin and pyruvate ferredoxin oxidoreductase by sodium nitrite. *Applied and Environmental Microbiology* 53(3); 1987; 549-552

The presence of ferredoxin in *C. botulinum* and its in vitro and in vivo effect of nitrite on the iron-sulphur enzymes of the phosphotransferase system, ferredoxin and pyruvate-ferredoxin oxidoreductase system were studied. Ferredoxin was isolated from *Pasterianum* and *C. botulinum* cultures incubated with 100 µg of sodium nitrite per ml for 45 min. The activity of in vivo treated ferredoxin was decreased as compared with controls pyruvate ferredoxin oxidoreductase isolate from *C. botulinum* cultures showed less activity than controls. It was concluded that antibotulinal activity of nitrite was due at least in part to inactivation of these two compounds. MVG

- 244 Dezfulian (M) and Bartlett (JG). Effects of irradiation on growth and toxigenicity of *Clostridium botulinum* types A and B inoculated onto chicken skins. *Applied and Environmental Microbiology* 53(1); 1987; 201-203

This study was conducted to examine the effects of 0.3-Mrad irradiation on growth and toxigenicity of *Clostridium botulinum* type A and B on chicken skins. Irradiation followed by aerobic or anaerobic incubation at 30 °C extended the shelf life of skin samples and delayed growth and toxin production by *C. botulinum*. During 2 wk of incubation at 10 °C, the irradiated and nonirradiated *C. botulinum* spores failed to grow or produce toxin. AS

Enterobacter

- 245 Cantoni (C) and Balzaretto (C). Enterotoxigenicity of *Enterobacter cloacae* and *Enterobacter aerogenes*. *Industria Alimentari* 26(4); 1987; 375-377 (It).

Mycotoxins

Aflatoxins

- 246 Chu (FS), Fan (TSL), Zhang (G-S), Xu (Y-C), Faust (S) and McMahon (PL). Improved enzyme-linked immunosorbent assay for aflatoxin B in agricultural commodities. *Journal of the Association of Official Analytical Chemists* 70(5); 1987; 854-857

Condition for Enzyme-linked immunosorbent assay (ELISA) for aflatoxin B₁ in corn meal and peanut butter were optimised and the protocol for ELISA improved. The assay time has been shortened to no less than in by promising the hyper immune serum coating and incorporating a more sensitive substrate. Details of the improved protocol and the results obtained by such analysis are discussed. MVG

- 247 Quintavalla (S). Degradation of aflatoxin M₁ by *Penicillium roqueforti*. *Industria Conserve* 62(1); 1987; 28-30 (It).

Strains of *Penicillium roqueforti* was examined to determine its ability to degrade aflatoxin M₁ (AFM₁) in two media (a synthetic culture broth and sterile whole milk) at 25 and 30 °C. All strains degraded the aflatoxins and after 8 days of incubation (1 ng of toxin/ml) the toxin was able to detect in the two media. The strain M beta completely degraded AFM₁ (10 ng/ml) in the milk within 10 days of incubation at 25 °C, while in the synthetic medium still about 17% of toxin was present after 9 days. BV

Pesticide residues

Methylcarbamate

- 248 Brauckhoff (S) and Thier (H-P). An analytical procedure for methylcarbamate insecticide residues and metabolites in foods of plant origin. *Zeitschrift für Lebensmittel-Untersuchung und -Forschung* 184(2); 1987; 91-95 (De).

An analytical procedure is described for identification and quantitative detn. of 15 methylcarbamate insecticides and 4 metabolites in fruits and vegetables. Clean up includes ethyl acetate extraction, isolation of residues by a Sep-Pak C disposable cartridge, elution with acetonitrile-water 1+1, and partitioning into dichloromethane. GLC is performed by using a well deactivated non-polar capillary column (e.g. SE-52, DB-1), splitless injection, and nitrogen-selective thermoionic detection. Derivation with 2,4-dinitrofluorobenzene is suitable for confirmation. The limits of detn. according to DFG criteria were in most cases as low as 0.005-0.01 mg/kg. AS

FOOD LAWS AND REGULATIONS

Nil

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GENERAL

- 249 Anon. Cutting the cost of effluent treatment. *Food Manufacture* 62(8); 1987; 24-25, 27

Discusses the problems of waste treatment in food industry. BV

- 250 Katona-Apte (J). Food aid as communal meals for the urban poor: The Comedor programme in Peru. *Food and Nutrition Bulletin* 9(2); 1987; 45-48

- 251 Lorusso (S), Chiacchierini (E), Maestro (R) and Riganti (V). Development of foodstuffs production and consumption in the world. *Industrie Alimentari* 26(2); 1987; 93-122 (It).

Provides statistical picture of world food production and consumption during the last twenty years which show differing trends from country to country. These variations are due to research and developments activities and the technical innovations in the agro food sector. BV

- 252 Pasricha (S), Ramnath (T) and Pralhad Rao. Common Indian snacks and their nutritive value. *Indian Journal of Nutrition and Dietetics* 24(1); 1987; 8-14

An effort has been made to provide nutritive value of some selected recipes by analysing multiple samples obtained from a set of households and the proportion of food item used in each serving was calculated. Statistical analysis was also carried out to find out the significant difference in the composition (proportion) of each serving (small, medium and large) and the investigation was spread over a period of about one yr. The results suggested that the variation in the ingredients used in each preparation were found to be negligible. It was found that the difference observed in nutrient content of recipes were due to the size of servings rather than ingredients used confirming that unwritten standard in practice prevails in Indian household preparations. NGKR

- 253 Senker (JM). Food technology in retailing-the threat to manufacturers *Chemistry and Industry* (14); 1987; 483-486

- 254 Wade (I). Community food production in Cities of the Developing Nations. *Food and Nutrition Bulletin* 9(2); 1987; 29-36

FOOD PROCESSING

Nil

FOOD PACKAGING

- 255 Leeson (R). Gaseous mixtures in controlled and atmosphere packaging. Food Technology in New Zealand 22(6); 1987; 24-25

This paper discusses the spoilage of food, which can be inhibited by the use of modified atm. packaging and the effects of gases (carbon dioxide, N, oxygen) used. The sources of gases (Air separation and carbon dioxide) and the importance of chilled temp. together with the gases in extending the shelf life are also discussed. BV

Packaging materials

- 256 Kinigakis (P), Miltz (J) and Gilbert (SG). Partition of VCM in plasticized PVC/Food simulant systems. Journal of Food Processing and Preservation 11(3); 1987; 247-255

The partition of vinyl chloride monomer between plasticized polyvinyl chloride and food simulant systems was studied in this paper. In this study the partition of VCM between PVC films and corn oil and between PVC films and water was studied. The results showed that the analysis of the PVC films showed no presence of residual VCM for the Type II and SMT films at a detectability limit of 2.6 p.p.b. (W/W-VCM/PVC). A specific procedure with predetermined calibration curves has to be followed in order to obtain reliable and reproducible results. At very low VCM levels the partition coefficient increased with decrease in monomer concn. indicating a preference of the monomer towards the polymer. In plasticised PVC films the level of plasticization may affect the residual VCM in the film the rate and extent of monomer migration from the polymeric matrix as well as the equilibrium monomer distribution between the PVC and the contacting phase. NGKR

Retorts

- 257 Enrique del valle (C) and Soule (CL). Modelling of temperature histories during venting of still retorts. Journal of Food Process Engineering 9(3); 1987; 213-220

This study was carried out to find a suitable method to predict the temp. evolution inside retorts during venting and to establish the way in which temp. evolution during venting is affected by changes in the operating condition. The parameters that are characteristics of this equation were connected to steam flow, initial temp. and retort load and the results showed that it is found possible to predict the coming up curves for different operating conditions. NGKR

FOOD ENGINEERING AND EQUIPMENT

Engineering

- 258 Anon. High-tech help for temperature control. Food Manufacture 62(8); 1987; 20-21, 23

Various techniques available and the equipment used for monitoring and controlling of temp. in food processing is discussed. BV

- 259 Mcpeak (DW), Idziak (E) and Smyrl (TG). The effect of freezing rate on the retention of volatile fatty acids during freeze drying of solutions containing high molecular weight solutes. *Canadian Institute of Food Science and Technology Journal* 20(3); 1987; 176-178

Model solutions of pectin, gelatin, and corn syrup solids containing volatile fatty acids (acetic, propionic, butyric, valeric, and isovaleric) were used to evaluate the effect of rapid and slow freezing on volatile retention during freeze drying. Solutions of pectin and corn syrup solids, which were frozen slowly before freeze drying, showed a significantly greater amount to volatile retention in comparison to the same solutions frozen rapidly before freeze drying. No significant difference in the amount of volatile retention was found between gelatin samples frozen rapidly or slowly. These results point out the importance of both the initial concn. of dissolved solids and the type of dissolved solids involved in the formation of microregions within the solids matrix. AS

- 260 Persson (P-O). Refrigeration and its influence on the World Food supply now and in the future. *International Journal of Refrigeration* 10(5); 1987; 279-284
- 261 Pflug (IJ). Factors important in determining the heat process value, F_0 for low-acid canned foods. *Journal of Food Protection* 50(6); 1987; 528-533
- 262 Webb (KS) and Rao (VNM). Computer codes and their application. Algorithm for quality control charts for variables using microcomputers. *Journal of Food Processing and Preservation* 11(3); 1987; 257-262

A computer algorithm which could accurately calculate and graphically represent the control charts using a microcomputer has been developed. One of the statistical quality control method used in quality assurance programmes is control charts for variables which consist of the average range charts and the average standard deviation charts. It was seen by use of these control charts the causes for variability in a product can be determined using the above microcomputer and the computer algorithm. NGKR

ENERGY IN FOOD PROCESSING

- 263 Loyell-Smith (JER) and Baldwin (AJ). Calorific values - gross or net. *New Zealand Journal of Dairy Science and Technology* 22(2); 1987; 175-178

In specifying and selecting heating equipment, an understanding of the net and gross calorific values of fuels is important. Without this, decisions involving expenditure of large capital sums and on-going running costs may be made on an incorrect basis. The net and gross calorific values are defined, and the means of deriving values for fuels are described. The application of calorific values in assessing the efficiency of engines, boilers and air heaters is discussed. AS

FOOD CHEMISTRY AND ANALYSIS

- 264 Sakai (Y), Watanabe (H), Takai (R) and Hasegawa (T). A kinetic model for oxidation of ascorbic acid and Beta carotene. *Journal of Food*

Processing and Preservation 11(3); 1987; 197-207

In this study a kinetic model of ascorbic acid oxidation in an aqueous solution in which dissolved concn. is held constant was developed. This consists of consecutive reactions A-B-C where A is ascorbic acid, B is an intermediate, C is an oxidised product, K_A is a zero order rate constant with respect to ascorbic acid concn., K_B is a first order rate constant with respect to intermediate concn. When it was assumed that A and B gave the same response to chemical detn. of A this model fitted very well. It is found possible that this was also useful for the description of degradation of beta carotene. NGKR

Chemistry (Analytical)

- 265 Hansel (W) and Strommer (R). Fluorimetric detection and quantification of preservatives in food stuffs. *Deutsche Lebensmittel-Rundschau* 83(10); 1987; 315-324

A reaction-chromatographical method is described to determine, through densitometry, the occurrence of preservatives in foodstuffs. With a simultaneous development of up to a 20 samples and 5 calibration values, it is possible to achieve a high samples run through in a short period of time and at relatively low costs. BV

- 266 Katsanos (NA) and Karaïskakis (G). Analytical application of reversed-flow gas chromatography. *Analyst* 112(6); 1987; 809-813

The technique of reversed-flow gas chromatography can be used to solve problems in analytical chemistry, e.g., measurement of the broadening factors in gas chromatography, calibration of gas chromatographic detectors, measurement of activity of coefficients and non-equilibrium headspace analysis. The method is basically a kinetic technique, but using the rates of physical processes rather than the rates of chemical reactions, it is a flow perturbation method, based on reversing the direction flow of the carrier gas for definite time intervals. The experimental set-up is very simple and needs only a slight modification of a conventional gas chromatograph, equipped with any kind of detector. AS

- 267 Peinado (J), Toribio (F) and Perez-Bendito (D). Kinetic-fluorimetric determination of ascorbic acid at the nanomole level. *Analyst* 112(6); 1987; 775-778

- 268 Sanchez-Pedreno (C), Tersea Sierra (M), Isabel Sierra (M) and Sanz (A). Kinetic determination of trace amounts of nitrite based on its inhibitory effect on the photochemical reaction between iodine and ethylenediamine tetra acetic acid. *Analyst* 112(6); 1987; 837-840

A kinetic method for the detn. of trace amounts of nitrite based on its inhibitory effect on the photochemical reaction between I₂ and EDTA (6×10^{-5} I₂, 2×10^{-4} EDTA, pH 5, 40 °C and 2000 lux) is reported. The reaction is monitored amperometrically (Pt-SCE, 100 mV) by measuring the time required for the current due to iodine to decrease to zero. Nitrite can be determined at concn. between 3 and 100 ng ml⁻¹. The proposed method has been applied to the detn. of nitrite in waste waters and alkaline nitrates. AS

FOOD MICROBIOLOGY AND HYGIENE

- 269 Purohit (HJ) and Dagainawala (HF). Effect of some inorganic nitrogen and phosphorus sources on microbial production of citric acid using tamarind seed powder. *Indian Journal of Microbiology* 26(1-2); 1986; 53-57

For the growth of *Penicillium chrysogenum* strains on tamarind seed powder, different N and P sources were tried. Acid treatment was given at 10 lb pressure (115 C) and altering the holding period. Ammonium carbonate as N sources and potassium dihydrogen phosphate as P sources was found best. As the raw material was rich in polysaccharides, there was very high accumulation of reducing sugar at the end of the fermentation. KAR

Enzymes

- 270 Mottola (HA). Enzymes as analytical reagents. Substrate determinations with soluble and with immobilised enzyme preparations. *Analyst* 112(6); 1987; 719-727

Amylases

- 271 Andersen (JR), Diderichsen (BK), Hjortkjaer (RK), De Boer (AS), Bootman (J), West (H) and Ashby (R). Determining the safety of maltogenic amylase produced by rDNA technology. *Journal of Food Protection* 50(6); 1987; 521-526

Papain

- 272 Chiou (RY-Y) and Beuchat (LR). Immobilization of papain on an anion exchange resin by physical adsorption followed by cross linking with glutaraldehyde. *Journal of Food Biochemistry* 11(2); 1987; 163-176

A method for immobilizing papain on an anion-exchange resin by a combination of air exclusion and physical adsorption was developed and stability of this immobilized papain as influenced by air and during storage has been studied. This method involves physical adsorption by vacuum drying of papain on Dowex MWA -1 (mesh 20-50) followed by intermolecular cross linking with 1% glutaraldehyde under neutral pH conditions. It was found that potassium phosphate buffer (0.1M, pH 12.5) was found to be better than acetate buffer (0.1M, Ph 4.0) for immobilization of papain. Nitrogen recovery was found to increase by increasing the reaction time with glutaraldehyde from 0.5 to 15 min by increasing the enzyme concn. from 1 to 80 mg/0.3 ml buffer 0.2 g resin. Recovery of absolute and proteolytic activities was also found to increase with time. These activities were found to increase in a papain concn. range of 5 mg/0.2 ml buffer/0.2g resin to 5 mg/0.3 ml buffer/0.2 g resin and then decreased with more buffer volumes ranging from 11.2 to 8.6%. Relative activity recovery was found to decrease with an increase in reaction time and enzyme concn. ranging from 40.5 to 7.5% and 47.5 to 1.5% resp. It was also seen that cystine and EDTA enabled more than 95% of the original activity immobilized papain to be maintained at 5 C for 2 months and sodium bisulphite and ascorbic acid inactivated immobilized papain. NGKR

- 273 Fukal (L), Kasafirek (E), Strejcek (F) and Kas (J). Selected p-nitroanilides as substrates for sensitive papain assay. *Journal of Food Biochemistry* 11(2); 1987; 99-107

This study was undertaken to find out the most suitable papain substrate among the 10 P-nitroanilides tested for papain assay. N-acetyl-leu-leu-Gly-P-nitroanilide and N-succinyl-Ala-Ala-(S-benzyl) Cys-P-nitroanilide were found to be very sensitive papain substrates making it possible to detect 0.5 or 0.7 μ /g of technical papain in 1 ml of beer in a short time and this detection limit is about 10 times lower than the usual papain level used for chill proofing. The estimated kinetic constants for papain bromelain and trypsin permit certain conclusions about papain specificity for oligopeptides which will help to prepare even more specific P-nitroanilide substrates. NGKR

Ethyl alcohol

- 274 Alain (K), Georges (ANZ) and Aka (Y). Ethanol production from pineapple juice in Cote d'Ivoire with preselected yeast strains. *Journal of Fermentation Technology* '(Hokko Kogaku Zasshi') 65(4); 1987; 475-481

Fresh pineapple juice was inoculated with 8 preselected yeast strains and incubated for high yield ethanol production at between 25 C and 35 C. The natural pH of the juice did not affect the growth of the strains or the alcohol yields. The higher ethanol concn. were obtained at 30 C and 35 C in the ranges of 27.17 to 46.50 g/l and 31.38 to 54.65 g/l, resp. with 82% and 89% as the highest yields when referring to the theoretical yield. The study indicated that strain CMI is the best performing strain at 30 C and 35 C according to yield and productivity. MVG

- 275 Daugulis (AJ) and Swaine (DE). Examination of substrate and product inhibition kinetics on the production of ethanol by suspended and immobilized cell reactors. *Biotechnology and Bioengineering* 29(5); 1987; 639-645

Kinetic expression for the fermentative production of relatively high concn. (12% W/V) of ethanol have been examined. Several expressions which account for both substrate and product inhibition have been formulated, and have been applied to suspended cell and immobilized cell reactors. Experimental data have been used to validate the kinetic expressions used, and the impact of combined inhibition on optimal reactor configuration has been assessed. The process implication of combined substrated and product inhibition for suspended and immobilized cell systems have been discussed. AS

- 276 Jimenez (J) and Benitez (T). Adaptation of yeast cell membranes to ethanol. *Applied and Environmental Microbiology* 53(5); 1987; 1196-1198

A highly ethanol-tolerant *Saccharomyces* wine strain is able, after growth in the presence of ethanol, to efficiently improve the ethanol tolerance of its membrane. A less-tolerant *Saccharomyces* laboratory strain, however, is unable to adopt its membrane to ethanol. Furthermore, after growth in the presence of ethanol, the membrane of the latter strain becomes increasingly sensitive, although this is a reversible process. Reversion to a higher tolerance occurs only after the addition of an energy source and does not take place in the presence of cycloheximide. AS

- 277 Park (YK), Sato (HH), Martin (MES) and Ciacco (CF). Production of ethanol from extruded degermed corn grits by a nonconventional fermentation method. *Journal of Fermentation Technology* '(Hokko Kogaku Zasshi') 65(4); 1987; 469-473

Degermed corn grits (DCG) were extruded at 150 C, with a compression rate of 1:2, and the materials were fermented by a

nonconventional fermentation method. Yield of ethanol from various concn. (12-30 g/200 ml) of extruded DCG were 0.37-0.38. It was found that the mold bran enzyme was superior to the glucoamylase preparations for ethanol fermentation, but combined enzyme systems such as a mixture of glucoamylase, acid protease, and cellulolytic enzymes are as efficient in converting the extruded DCG to ethanol as the mold bran enzyme alone. AS

Fermented products

Idli

- 278 Kasturiba (B) and Phadnis (L.). Effect of different cereal pulse ratio on riboflavin content in case of Idli. Indian Journal of Nutrition and Dietetics 24(6); 1987; 175-177

Idli was prepared by using cereals and pulses in the ratio of 1:1, 2:1, 3:1 and 4:1 and also fermenting for 12, 18 and 24 h to find out the vitamin content at different periods of fermentation. Fermentation upto 14 h resulted in max. increase of riboflavin than either 12 and 18 h fermentation. Max. increase of vitamin was in batter having 2:1 cereal pulse ratio at 18 h fermentation and the vitamin content of other batters were found to be in the order of 3:1, 1:1 and 4:1 ratio. At 24 h of fermentation, 2:1 ratio had the highest increase of vitamin. However, 2:1 and 3:1 ratios were found to be the best ratios for the synthesis of the vitamin. But when the batters were cooked to final products the riboflavin decreased considerably in all and at all fermentation periods but this decrease was not significant. NGKR

Microorganisms

Bacteria

- 279 Pongsawasdi (P) and Yagisawa (M). Screening and identification of a cyclomalto-dextrin glucanotransferase-producing bacteria. Journal of Fermentation Technology '(Hokko Kogaku Zasshi)' 65(4); 1987; 463-467

Escherichia coli

- 280 Davis (VM). Increased reliability in detection of enterotoxigenic Escherichia coli by DNA colony hybridization. Journal of Food Protection 50(6); 1987; 487-489

Effects of time and temp. were investigated to optimise the adherence of colonies to the filter and minimise false-negative results as a consequence of having to use a -20 °C freezer in the absence of a -70 °C freezer for accurate development of a radiogram. MVG

- 281 Kanamitsu (O), Kitajima (N) and Nagoya (I). A new enzymatic reaction for production of new type of amino acids by Escherichia coli: Production of Alpha-amino Beta (1-Indoline) propionic acid from indoline and L-serine. Journal of Fermentation Technology '(Hokko Kogaku Zasshi)' 65(4); 1987; 395-403

The findings of the reaction between indole-mimic compounds and L-serine by the catalytic action of the lyophilized cells of E. coli T4-3, and the data for the identification of a main product from indoline and L-serine as Alpha-amino Beta-(1-indoline) propionic acid are described. MVG

Listeria

- 282 Farber (JM) and Speirs (JI). Monoclonal antibodies directed against the flagellar antigens of *Listeria* species and their potential in EIA-based methods. *Journal of Food Protection* 50(6); 1987; 479-484

In order to develop a rapid enzyme immunoassay (EIA) for detection of *Listeria* sp in foods, efforts were made to develop a nonspecific antibody which would react only with *Listeria* sp. Three main classes of immunoglobulins were found that reacted with *Listeria* strains containing either the A, B, or C flagellar antigen. These monoclonal antibodies reacted with monocytogenes, *L. welshimeri*, *L. seeligeri*, *L. ivanocii*, and *L. innocua*, but not with *L. grayi*, *L. murrayi* or *L. denitrificans*. These monoclones did not cross react with any of the 30, non-*Listeria* cultures examined. The antibodies when tested on cheese and milk samples, naturally contaminated with *L. monocytogenes*, gave positive results within 2 working days. MVG

Streptococcus cremoris

- 283 Gautier (M) and Chopin (M-C). Plasmid-determined systems for restriction and modification activity and abortive infection in *Streptococcus cremoris*. *Applied and Environmental Microbiology* 53(5); 1987; 923-927

Three additional plasmids (PIL 103, PIL 105, and PIL 107) from *Streptococcus cremoris* IL964 coding for phage defence mechanisms are described. Plasmid PIL 105 prevented phage multiplication in 97% of the infected cells and reduced phage size in the remaining 3%. The two other plasmids mediated R/M systems. MVG

- 284 Hugenholtz (J), Van Sinderen (D), Kok (J) and Konings (WN). Cell wall-associated proteases to *Streptococcus cremoris* Wg2. *Applied and Environmental Microbiology* 53(4); 1987; 853-859

The proteolytic system of one strain, *S. cremoris* Wg2 has been studied and the characteristics of the two components, protein A and protein B has been analysed. Immuno-gold labeling has been used to determine the exact localization of the proteases in the cell. MVG

Fungi

Yeasts

- 285 Bilinski (CA), Russell (I) and Stewart (GG). Physiological requirements for induction of sporulation in lager yeast. *Journal of the Institute of Brewing* 93(3); 1987; 216-219

A study of the effects on sporulation of temp. and of presporulation growth on several carbon sources has led to the identification of physiological conditions for a marked improvement of ascosporeogenesis in lager yeast. Sporulation occurred only on incubation of both presporulation and sporulation cultures at 21 °C. Experiments in which sporogenic abilities were monitored at various stages in the growth curve demonstrated max. ascus production in sporulation medium inoculated with acetate grown cells harvested from stationary rather than exponential phase. Increasing the potassium acetate concn. in sporulation medium gave further increases in total sporulation and a marked induction of tetrad production. Several differences in spore morphology were found between ale and lager strains studied and physiological requirements for optimal sporulation were compared. AS

- 286 Hope (CFA). Cinnamic acid as the basis of a medium for the detection of wild yeasts. *Journal of the Institute of Brewing* 93(3); 1987; 213-215

Cinnamic acid ($100 \mu \text{g ml}^{-1}$) incorporated in a solid medium was found to inhibit the growth of brewing strains (Por-) of yeast while permitting the growth of Pof+ wild yeast contaminants. Typically, colonies of *Saccharomyces cerevisiae* var. diastaticus (Por+) mixed with brewing yeast (*S. cerevisiae* NCYC 240) were visible after 5 days incubation at 25 °C. The incubation time required to detect a selection of brewery wild yeast isolates was found to vary from 3-12 days. AS

- 287 Jermini (MFG), Weber (K) and Schmidt-Lorenz (W). Influence of prolonged culture storage on the osmotolerance of *Zygosaccharomyces* yeasts. *Journal of Food Protection* 50(6); 1987; 514-520

To record the effect of prolonged culture storage on the sugar tolerance of *Zygosaccharomyces rouxii* and *Z. bailii*, the fermentation behaviour of three freshly isolated strains in four different glucose broths (water activity values 0.963, 0.936, 0.909 and 0.858, resp.) was compared with that of the same strains after 2 yr of storage (a) on high-sugar agar slants with repeated subculturing and (b) in Biomalt (liquid malt extract) without subculturing. The trials with stock strains resulted in large reduction of both ethanol yield and production rate. Cells stored in liquid malt extract showed a slightly faster and stronger fermentation than cells maintained on agar slants. Therefore, for storage of osmotolerant culture collections use of natural liquid products such as Biomalt, without subculturing, is suggested. AS

- 288 Jermini (MFG), Schmidt-Lorenz (W). Cardinal temperatures for growth of osmotolerant yeasts in broths at different water activity values. *Journal of Food Protection* 50(6); 1987; 473-478

Influence of substrate water activity on min. temp. ($T_{\min}$) optimum temp. (T_{opt}) and max. temp. ($T_{\max}$) for the growth of several osmotolerant yeast strains (*Zygosaccharomyces rouxii*, *Z. bailii*, *Z. bisporus*, *Debaromyces hansenii*, *Torulaspora delbrückii* and *Saccharomyces cerevisiae*) was investigated over the temp. range of 4-46 °C at four different glucose levels. Results showed that these osmotolerant yeast strains exhibited higher cardinal temp. ($T_{\min}$, T_{opt} and $T_{\max}$) at an increased solute concn. in the substrate. As the water activity decreased the cardinal temp. were shifted toward higher values. At water activity < 0.922 none of the tested strains grew at 4 °C within 30 days. Several strains could grow at 42 °C only in the presence of high sugar concn. MVG

- 289 Tani (Y) and Vongsuvanlert (V). Sorbitol production by a methanol yeast, *Candida boidinii* (Kloeckera sp.) No. 2201. *Journal of Fermentation Technology* '(Hokko Kogaku Zasshi)' 65(4); 1987; 405-411

Brewer's yeast

- 290 Oosthuizen (A), Kock (JLF), Viljoen (BC), Muller (HB) and Lategan (PM). The value of long-chain fatty acid composition in the identification of some brewery yeasts. *Journal of the Institute of Brewing* 93(3); 1987; 174-176

The cellular long-chain fatty acids of 72 strains representing 29 species, of brewery yeasts were extracted by saponification and analysed as methyl esters by gas chromatography. With this method, it

was possible to distinguish between *Saccharomyces cerevisiae* and five other groups from the brewery industry, only 4 h after they were obtained from 48 h old cultures under standard conditions. This compares favourably with the 7 to 10 days for conventional methods. AS

Hansenula polymorpha

- 291 Chandrani Wijeyaratne (S), Ohta (K) and Hayashida (S). Isolation and growth characteristics of a nystatin resistant mutant of a thermotolerant yeast *Hansenula polymorpha*. *Journal of Fermentation Technology* '(Hokko Kogaku Zasshi') 65(4); 1987; 457-461

A nystatin-resistant mutant (NR-21) of a thermotolerant yeast, *Hansenula polymorpha* CK-1, was isolated by mutagenesis with ethyl methane sulfonate, followed by selection for resistance to nystatin (50 units/ml). The mutant was defective in ergosterol biosynthesis. Specific growth rates (H^{-1}) of the mutant were reduced to 0.35 at 40 °C and 0.16 at 50 °C as compared with the wild type (0.53 at 40 °C and 0.28 at 50 °C). The mutant grown with ergosterol-phosphatidylcholine emulsion at 50 °C incorporated ergosterol and its specific growth rate was increased to 0.41, which was comparable to that of the wild type grown under the same conditions. AS

Saccharomycopsis fibuligera

- 292 Sandhu (DK), Vilku (KS) and Soni (SK). Production of Alpha amylase by *Saccharomycopsis fibuligera* (Syn. *Endomycopsis fibuligera*). *Journal of Fermentation Technology* '(Hokko Kogaku Zasshi') 65(4); 1987; 387-394

Seven different yeasts, *Candida tropicalis*, *Hansenula anomala*, *Lipomyces* sp., *Pichia membranaefaciens*, *Saccharomycopsis fibuligera*, *Saccharomyces cerevisiae* and *Trichosporon pullulans* were screened for amylolytic activity during a study of some cereal based fermented foods. Max. alpha amylase activity was observed in *S. fibuligera* (6.56 unit/ml), whereas the min. was observed in *S. cerevisiae* (1.93 unit/ml). The mutagenic treatment of *S. fibuligera* improved the yield by two fold as compared to the wild type which was restricted to the stationary growth phase in shake culture. The standard conditions for optimum enzyme production were 1.5% nw/v substrate concn., pH 5.0 and incubation at 28 °C. AS

BIOTECHNOLOGY

- 293 Sinki (GS). Biotechnology: Approaching a critical mass. *Perfumer & Flavorist* 12(6); 1987; 37-38, 40-41, 44

The use of biotechnology to produce flavours is discussed briefly the demand for new naturals, the role of plant tissue cultures (PTC) and metabolites accumulated from PTC optimized cultures for flavours production are discussed. BV

TISSUE CULTURE

Nil

FOOD ADDITIVES

Preservatives

Nisin

- 294 Lokendra Singh), Mohan (MS) and Sankaran (R). Nisin as an aid for thermal preservation of Indian dishes-Upma and Kheer. *Journal of Food Science and Technology, India* 24(6); 1987; 277-280

Nisin, a non-toxic metabolite of *Streptococcus lactis* has been studied as an aid for thermal preservation of two Indian dishes, namely, medium acidic Upma (pH 5.0-5.2) and non-acidic Kheer (pH 6.2-6.4). Upma was made by roasting wheat semolina (Soji) and cooking after spicing and addition of cooked vegetables. Kheer was made with milk, rice and sugar in the proportion of 14.1:840 g: 2.25 Kg. *Bacillus stearothermophilus* was used as the test organism. The acidity of the food decided the amount of nisin required for its preservation. Nisin at levels of 25 and 200 IU/g could sufficiently lower the thermal processing of upma and kheer resp. and enhance the storage life to > 6 months. MVB

Sorbic acid

- 295 Lund (BM), George (SM) and Franklin (JO). Inhibition of type A and type B (proteolytic) *Clostridium botulinum* by sorbic acid. *Applied and Environmental Microbiology* 53(5); 1987; 935-941

This paper reports the effect of sorbic acid and pH on the number of vegetative *Clostridium botulinum* cells capable of growth in comparison with the number capable of growth under optimum conditions. MVB

- 296 Ronning (IE) and Frank (HA). Growth inhibition of putrefactive anaerobe 3679 caused by stringent-type response induced by protonophoric activity of sorbic acid. *Applied and Environmental Microbiology* 53(5); 1987; 1020-1027

The inhibitory effects of potassium sorbate on the bioenergetics, phenylalanine uptake, protein synthesis, and certain aspects of cell regulation were examined in putrefactive anaerobes 3679. Undissociated sorbic acid appeared to act as a protonophore by lowering the intracellular pH and dissipating the proton motive force of the membrane. Sorbate inhibited the uptake of phenylalanine, decreased the rate of protein synthesis, and altered patterns of phosphorylated nucleotide accumulation, resulting in increased intracellular conc. of GTP, ppGpp, and an unidentified compound (possibly pppGpp). The addition of a noninhibitory amount of tetracycline released the inhibition of growth by sorbate. Based on these results, we concluded that the inhibition of putrefactive anaerobe 3679 by sorbate resulted from a stringent-type regulatory response induced by the protonophoric activity of sorbic acid. AS

Sweeteners

Nystose

- 297 Ziesenitz (SC) and Siebert (G). In vitro assessment of nystose as a sugar substitute. *Journal of Nutrition* 117(5); 1987; 846-851

Nystose represents a fructooligosaccharide with two fructose molecules linked via Beta (1-2) bonds to the fructosyl moiety of sucrose. This tetrasaccharide was subjected to an array of in vitro tests designed for the assessment of potential sugar substitutes, before animal or human studies. Beta-fructosidase from yeast cleaved nystose at about 5% of the initial rate observed with sucrose. The terminal fructose was released first. Glycosyltransferase from *Streptococcus mutans* 620 did not utilize nystose for the formation of a glucan-type polysaccharide. Anaerobic fermentation of nystose by a suspension of mixed dental plaque microorganisms and by *S. mutans* NCTC 10449 was about half as fast as with sucrose. Thin-layer chromatography at various reaction times with *S. mutans* NCTC 10449 indicated the terminal fructose as the site of first attack. Analysis for free monosaccharides confirmed these data because free fructose exceeded free glucose at early reaction times for more than would follow from the 3:1 ratio of fructose to glucose in the nystose molecule. High pressure liquid chromatography assays demonstrated lactic and acetic acids as the main fermentation products. Carbohydrases from human jejunal mucosa did not attack nystose. However, cecal anaerobic microorganisms of the rat fermented nystose rapidly into acids. AS

Sodium saccharin

- 298 Anderson (RL), Lefever (FR) and Maurer (JK). Effect of inherent urine output on the response of male rats to 7.5% dietary sodium saccharin. *Food and Chemical Toxicology* 25(9); 1987; 641-645

Young male rats were preselected as high urine (57 g/kg body wt.) or low urine (35 g/kg) voiders and were fed a diet containing 7.5% sodium saccharin (NaS) for 10 wk. Urine output was found to be a stable characteristic and high urine output was associated with increased water and feed consumption and increased wt. gain. Rats responded in a very similar fashion to 7.5% dietary NaS regardless of their inherent urine output. NaS ingestion was associated with increase in water consumption, caecal mass and urine volume. Among rats that had ingested 7.5% dietary NaS for 10 wk there was a high incidence (12/20) of bladder epithelial hyperplasia. The results are discussed with regard to the concept that increased urine output is an important factor in NaS-induced bladder tumours. AS

CEREALS

- 299 Indrani (D), Leelavathi (K) and Sidhu (JS). Flour mill streams. IV Study of phytic acid distribution. *Journal of Food Science and Technology, India* 24(6); 1987; 316-317

Nine different flour streams, namely, first break (B_1), second break (B_2), third break (B_3), fourth break (B_4), first reduction (C_1), second reduction (C_2), third reduction (C_3), fourth reduction (C_4), fifth reduction (C_5) and straight run flour (SRF) consisting of all the above flour streams, as obtained at the mill of the International School of Milling Technology (ISMT), were analysed for total, inorganic and phytic P. The total, inorganic and phytic P contents differed significantly among these flour streams and increased progressively towards the tail end flour streams. The flours from B_4 , C_5 and C_3 were found to contain 142.4, 108.7 and 95.3 mg P/100 g, resp. of phytic P which is significantly higher. MVG

- 300 Maccoll (AJ). Protein quality of wheat and triticale flour fortified with total milk protein. *New Zealand Journal of Dairy Science and*

Technology 22(2); 1987; 105-110

The protein efficiency ratio (PER) and apparent digestibility (AD) of four flours and four breads made from these flours were measured using rat feeding trials. There was no significant difference between the growth of rats fed flour and the growth of rats fed the corresponding bread. Although the PERs obtained for each protein source indicated that triticale protein was nutritionally superior to wheat protein, the AD of triticale protein was lower than that of wheat protein. This may negate any advantage gained from the higher PER. Fortification of both wheat and triticale flour with TMP significantly improved the protein quality (PER and AD) of the flours and breads. AS

Barley

- 301 Brunswick (P), Manners (DJ) and Stark (JR). The development of Beta-D-glucanases during the germination of barley and the effect of kilning on individual isoenzymes. *Journal of the Institute of Brewing* 93(3); 1987; 181-186

Two endo-1, 3:1, 4-Beta-D-glucanase isoenzymes developed in response to gibberellic acid, during the germination of barley. Two endo-1,3-Beta-D-glucanases, one present in ungerminated, steeped grain, also developed but did not appear to be markedly stimulated by the hormone. A comparison of crude and partially purified malt extracts highlighted the errors that are involved in the specific detn. of endo-1,3,:1,4-Beta-glucanase activity in crude extracts. The development and effect of kilning on individual malt isoenzymes was demonstrated by carboxymethylcellulose (CM-cellulose) chromatography profiles. Kilning and dry-milling of germinated barley caused losses of 80-90% in the specific endo-1,3:1,4-Beta-glucanase activity. The effect was less pronounced if wet-milling was substituted for dry-milling. Extraction studies and CM-cellulose chromatography profiles indicated that both endo-1,3:1,4-Beta-glucanase isoenzymes were heat labile and were particularly susceptible to oxidation. In contrast, endo 1,3-Beta-glucanase activity and cellobiose activity in malt extracts were less affected by the kilning process or extraction procedures. Preliminary results suggested that one of the endo-1,3-Beta-glucanase isoenzymes was more sensitive to kilning. AS

- 302 Crescenzi (AM). Factors governing the milling of malt. *Journal of the Institute of Brewing* 93(3); 1987; 193-201

A method has been developed using a laboratory 2 roll mill for reproducibly milling malt produced from European Barley (two-row). The procedure can be readily adapted to give grists of similar particle size distribution to those produced by either commercial flour or six roll mills. Factors which were considered likely to affect the milling of malt were studied with particular attention to moisture level, the degree of modification, extent of kilning, influence of storage, differences in grain size and extent of steam conditioning. Most of these factors did exert an effect on milling. However, in the majority of cases the values needed to be outside normal commercial limits before substantial changes in milling performance were observed. Studies employing a laboratory mashing system have shown that by using malts containing C.a. 6% moisture it is possible to reduce wort separation times without affecting extract recovery. Steam conditioning can have a marked beneficial effect on the milling performance of malt provided the extent of moisture pick-up is carefully controlled. AS

- 303 Voragen (A (GJ), Schols (HA), Marijs (J), Rombouts (FM) and Angelino (SAGF). Non-starch polysaccharides from barley: Structural features and breakdown during malting. *Journal of the Institute of Brewing* 93(3); 1987; 202-208

An extraction procedure is described for the complete solubilisation and fractionation of non-starch polysaccharides (NSP) from barely and malt, using ethanol, water and 4-methylmorpholin-N-oxide. Important structural features of the NSP are preserved with its non-destructive procedure. The fractionation method enables the investigation of structural features of NSP fractions and of NSP breakdown during malting. AS

Wheat

- 304 Cressey (PJ). Wheat-bug damage in New Zealand wheats : Some properties of a glutenin hydrolysing enzyme in bug-damaged wheat. *Journal of the Science of Food and Agriculture* 41(2); 1987; 159-165

In this study a number of characteristics of the problematic enzyme involved in New Zealand bug damage were analysed using a modified SDS sedimentation test. The results showed that this enzyme appeared to be a water soluble alkaline protease with an activity optimum at pH 9.0. It is found to be relatively heat stable but the temp. optimum for activity is quite low (35-40 °C). This enzyme is also not inhibited by EDTA or methylmaleimide but is inhibited by the metal ions CO^{2+} , MN^{2+} , and Fe^{2+} . NGKR

- 305 Henderson (S). A mean moisture content-equilibrium relative humidity relationship for nine varieties of wheat. *Journal of Stored Products Research* 23(3); 1987; 143-147

Moisture content -ERH relationship for nine var. of wheat has been studied at 25 °C. The results showed that the safe mean moisture was found to be 14.7% wet wt. basis for all var. of wheat at an ERH of 70%. The moisture content in stored wheat may need to be as low as 13% to be safe from attack by mites granting for varietal and measurement differences. The hysteresis between adsorption and desorption reached a max. of 0.7% moisture at 40-50% RH and found to be statistically significant upto 75% RH. Chang and Pfost equation was used for calculating equilibrium moisture contents and comparing with the measured moisture contents. NGKR

- 306 Indrani (D), Sukanya (S) and Sidhu (JS). Genetic variability in the milling and vermicelli quality of some Indian durum wheat cultivars. *Journal of Food Science and Technology, India* 24(6); 1987; 313-315

The genetic variability in the chemical, milling and vermicelli quality characteristics of some promising cv. of durum wheat was studied. Forty four samples comprising 32 var. grown in different parts of the country were obtained for analysis. The total and fine semolina yields ranged from 44.5 to 74.0% and 25.6 to 41.2% resp. Similarly, a wide variation in cooking quality of vermicelli was observed. The gruel solids loss ranged from 3.8 to 9.6%. MVG

- 307 Lairon (D), Lacombe (C), Borel (P), Corraze (G), Nibbelink (M), Chautan (M), Chanussot (F) and Lafont (H). Beneficial effect of wheat germ on circulating lipoproteins and tissue lipids in rats fed a high fat, cholesterol containing diet. *Journal of Nutrition* 117(5); 1987; 838-845

Wheat flour

- 308 Paredes-Lopez (O), Barba-Rosa (AP) and Gonzalez-Castaneda (J). Physicochemical and functional properties of Mexican wheat flours for breadmaking. *Cereal Foods World* 32(9); 1987; 602, 604, 607, 608

The consumption of bread is rapidly increasing in Mexico, and consequently the number and capacity of wheat milling plants is growing. Hence, it was considered important to carry out a preliminary study on some of the breadmaking properties of the leading flours in the market. Eight commercial flours and popular wheat var. in the local market (Celaya) were used for this study. Ash content varied greatly along with particle size distribution and rheological properties of these flours. Significant correlation coefficients were obtained between alveogram values and farinograph properties. The baking quality of only two flours, a commercial samples and Celaya flour, was graded as very satisfactory. Results obtained could serve as overall quality criteria of these products in the market. AS

MILLETS

- 309 Mandhyan (BL), Sharma (SK) and Tyagi (HR). Study of physical properties, milling performance and cooking time of minor millets. *Journal of Food Science and Technology, India* 24(6); 1987; 280-282

Kodo (*Paspalum scrobiculatum* L.), kutki (*Panicum miliaceus* L.) and sawan (*Panicum miliare* L.) were studied for physical properties, milling and cooking qualities. Results show that kutki is the smallest and kodo is the largest among these millets. Sawan had the highest milling efficiency followed by kodo and kutki while kodo had the highest husk content followed by kutki and sawan. All the three millets cooked well in 25 min. MVG

Corn

- 310 Harrison (MA), Clayton Silas (J) and Carpenter (JA). Incidence of aflatoxigenic isolates of *Aspergillus flavus/parasiticus* obtained from Georgia corn processing plants. *Journal of Food Quality* 10(2); 1987; 101-105

The objective of this study was to investigate the incidence of *Aspergillus flavus/parasiticus* which only produce aflatoxin B1, B2, G1 and G2 in bulk corn and settle dust samples from two corn processing plants in Georgia during 1984 and 1985. The results showed that conidia of *A. flavus/parasiticus* were found in all corn samples evaluated as well as in settled dust samples taken within these processing facilities. From the isolates obtained by using selective medium and subsequent culturing only 55% of the isolates were confirmed as belonging to *A. flavus/parasiticus* group. When their ability to produce aflatoxins was evaluated 32% of the isolates cultured for aflatoxin production were found to be aflatoxigenic. NGKR

- 311 Khorasani (GR) and Savage (GP). Protein quality of different varieties of maize. *Nutrition Reports International* 36(1); 1987; 99-108

Several cv of maize (*Zea mays* L.) were analysed for their proximate and amino acid contents. Two high lysine cv grown in the USA were compared to normal var. grown in the United Kingdom and Iran. Each samples was then combined into semi-purified diets and fed to male weanling rats. The ground maize provided the sole source of protein

in each diet. The true digestibility of the maize protein in all diets was consistently high (90.5 - 92.7). The mean-biological values (BV) of the high lysine maize var. 72.7 was significantly higher than the mean value 55.7 for the normal maize var. Supplementation of a normal maize var. with lysine alone and lysine with isoleucine and valine gave a significantly improved biological value of the maize protein. AS

- 312 Lee (Y-H), Robinson (CW) and Moo-Young (M). Evaluation of organosolv processes for the fractionation and modification of corn stover for bioconversion. *Biotechnology and Bioengineering* 29(5); 1987; 572-581

Optimal prehydrolysis condition was determined to screen the potentially suitable organosolv chemicals for delignification of corn stover; the effectiveness of agitated bed will for enzymatic hydrolysis of preheated corn stover was evaluated. MVG.

Corn syrup

- 313 Susan Luenser. Applications of microbial enzymes to produce high fructose corn syrup and other corn sweeteners. *Brewers' Digest* 62(5); 1987; 36-39

Pearl millets

- 314 Dhankher (N) and Chauhan (BM). Preparation, acceptability and B vitamin content of rabadi-a fermented pearl millet food. *International Journal of Food Science and Technology* 22(2); 1987; 173-176

The present investigation was to optimize the temp. and fermentation period for preparation of acceptable rabadi (a wholesome food of low and average income rural population prepared from pearl millet, *Pennisetum typhoides* Rich.) and to study changes in chemical composition, titratable acidity, pH and B vitamin contents. BV

Ragi

- 315 Pandey (KN). Preservation of moist ragi grains with certain mild acids. *Madras Agricultural Journal* 73; 1986; 579-585

The preservative ability of propionic acid and acetic acid at high moisture contents (15-20%) of healthy moist grains of *Eleusine coracana* was studied. Acetic acid at 3% level prevented and avoided multiplication of all the mycoflora except *Aspergillus fumigatus* Fres. which needed a higher concn. With propionic acid, the viability of the grain was lost when used at 9.14 l/ton. The seeds were viable with the acetic acid treatment even at 5% concn. MVG

PULSES

Chickpeas

- 316 Newman (CW), Roth (NJ), Newman (RK) and Lockerman (RH). Protein quality of chickpea (*Cicer arietinum* L.). *Nutrition Reports International* 36(1); 1987; 1-8

Three chickpea (CP) cv, CP-8, UC-5 (kabuli types) and Garnet (desi type) were compared to soybean meal (SBM) as sources of protein for weaning rats. The percent protein, fat, and fiber (dry basis) of CP-8, UC-5, Garnet and SBM were, resp. 18.3, 6.9, 2.4, 18.8, 7.1, 2.6,

19.4, 4.7, 9.5, and 47.1, 1.2, 7.1. Lysine expressed as a% of dry seed and g/16g amino acid N of CP-8, UC-5, Garnet and SBM were resp. 1.21, 7.56, 1.22, 7.48, 1.29, 7.58, and 3.29, 7.26. Isonitrogenous, isocaloric 10.0% protein, vitamin-mineral fortified diets were prepared from three CP lines and SBM using corn starch as the major energy source. Each diet was fed to 13 week old weaning Sprague Dawley male rats. Differences were not significant ($P > .10$) in the growth or feed intake of the rats in the growth study. Average protein efficiency ratios (PER) of rats fed CP-8, UC-5, Garnet and SBM diets were 2.87, 2.70, 2.71, and 2.77, resp. True protein digestibility (TPD) was highest ($P < .01$) for SBM (88.2%), intermediate for CP-8 and UC-5 (84.4 and 85.2%) and lowest for Garnet (79.1%). Biological value (BV) was not different between CP and SBM proteins, thus net protein utilization (g protein digested $\times$ BV $\times$ 100) followed the same pattern ($P < .05$) as TPD. These results indicate almost equal protein quality of CP and SBM protein although the latter is slightly more digestible. The lower TPD of Garnet compared to CP-8 and UC-5 may be due to its higher fiber content or higher concn. of polyphenolic compounds that have been reported in desi type chickpea. AS

Cowpeas

- 317 Akinyele (IO) and Akinlosotu (A). Contribution of cowpea *Vigna unguiculata* in a mixed diet to the nutrient intake of rural children in Ibadan. *British Journal of Nutrition* 58(1); 1987; 31-39

Sixty four rural subjects of Ibadan were fed with cowpea a mixed diet. The result showed that the subjects (randomly selected) were, according to mother, reacted to cowpea foods. It was also shown that in all subjects protein, energy and riboflavin needs were not met by the total food consumed. However, the requirements of vitamin A, thiamin and iron was met. MVB

Greengram

- 318 Kammar (PM) and Naik (RK). Changes in nutritive composition of greengram (*Phaseolus aureus* Roxb.) during storage at household level. *Indian Journal of Nutrition and Dietetics* 24(7); 1987; 190-198

This investigation was undertaken to assess the changes in nutrient composition of greengram (*Phaseolus aureus* Roxb.) stored in gunny bags for 6 months under rural practices. The results of the proximate composition revealed that there was an increase in moisture, protein, fibre, fat and minerals in experimental samples as the length of storage increased. These increments were higher in transitional zones as compared to the dry zone of Karnataka (India). The increment was significant between the samples. Significant decrease in carbohydrate content was observed, the depletion being greater with increase in the length of storage. NSKR

- 319 Meena Thandon and Gurmukh Singh. Effect of addition of defatted soy flour on physicochemical characteristics and acceptability of green gram Barian. *Journal of Food Science and Technology, India* 24(6); 1987; 283-285

On addition of defatted soy flour (5-30%), there was increase in protein, ash and crude fibre contents and decrease in crude fat and total carbohydrates contents of moong barain (Wadian, a traditional savoury preparation of Punjab, India). The colour of barian become darker and the extent of non-enzymatic browning increased at higher levels of soy flour. Rehydration became poor because of soy fortification rendered the barian hard in texture. The consumer acceptability

decreased with increase in level of incorporation of soy flour. However, overall acceptability did not significantly change on addition of soy flour upto 10% level. MVB

Lupins

- 320 Hung (TV), Handson (FD), Amenta (VC), Kyle (WSA) and Yu (RS-T). Content and distribution of manganese in lupin seed grown in Victoria in lupin flour, spray-dried powder and protein isolate prepared from the seeds. *Journal of the Science of Food and Agriculture* 41(2); 1987; 131-139

In this study the levels of Mn found in 33 samples of lupins grown under field conditions on various soil ranges in Victoria, Australia have been determined and the Mn content of whole flour, spray dried powder and protein isolate produced from the seeds is also discussed. The results of analysis showed that *L. angustifolius* had a much lower Mn content (61 mg Kg^{-1}) than *L. albus* (1316 mg Kg^{-1}). Hence the former variety is fit for use for the whole flour, spray dried flour where as the latter is useful for the production of protein isolate in order to avoid the potential Mn toxicity problems from these foodstuffs. NGKR

Mesquite

- 321 Del Valle (FR), Marco (E), Becker (R) and Saunders (RM). Development and evaluation of a procedure to produce mesquite (*Prosopis* sp) pod protein concentrate. *Journal of Food Processing and Preservation* 11(3); 1987; 237-246

An alternative mechanical process which does not utilise extrusion was evaluated for producing a mesquite pod protein concn. Four variations of this process were studied and all these involved in milling and dry sieving and one of them included toasting prior to grinding. It was found that dry ensieving conc. the protein in the fine (-100 mesh) fraction. The process involving toasting was found to give max. protein recovery and low fibre concn. in the fines. It was also seen that in vitro digestibilities of the coarse ($+45$ mesh) and intermediate ($+100$ mesh) fractions indicated their suitability for use in cattle feeds. NGKR

Mungbeans

- 322 Chen (S), Breene (WM) and Schowalter (C). Effects of growth regulators on yield and quality of mungbean sprouts grown in an automatically controlled chamber. *Journal of Food Quality* 10(4); 1987; 219-238

This study was designed to examine the influence of gibberellic acid, ethephon and abscisic acid on the quality and yield of mungbean sprouts. The application of the growth regulators has been done in a microprocessor controlled chamber containing mungbean sprouts. The quality of mungbean sprouts is judged by thick hypocotyls and short roots, the results showed that ethephon and gibberellic acid treatments produced sprouts having substantially more food value in terms of dry matter, protein and ascorbic acid per 100g of mungbeans than the controls whereas the single or double application of ethephon treatment improved the mungbean sprout quality. The advantages in this chamber are that it provided a simple convenient and reproducible sprout growing process and has a potential in small factories or restaurants or laboratory. NGKR

- 323 Khattak (SUK), Hamed (M), Khatoon (R) and Mohannad (T). Relative susceptibility of different mungbean varieties to *Callosobruchus maculatus* F. (Coleoptera:Bruchidae) *Journal of Stored Products Research* 23(3); 1987; 139-142

The susceptibility of eight different mungbean var. or mutants to *Callosobruchus maculatus*(F) was studied under laboratory experiments. The results on progeny, percent wt. loss, damage, adult longeveity, development period showed that mutant 71-27 was least susceptible followed by var. Pak-22, 6601 and mutant 71-17 increasing significantly through var. Aum-233, and mutants 121-25, 19-19, and M-28. Significant correlations were observed between the variables. AS

Peas

- 324 Gruen (LC), Guthrie (RE), and Blagrove (RJ). Structure of a major pea seed albumin: Implication of a free sulphydryl group. *Journal of the Science of Food and Agriculture* 41(2); 1987; 167-178

OILSEEDS AND NUTS

Groundnuts

- 325 Aboagye (Y) and Stanley (DW). Thermoplastic extrusion of peanut flour by twin-screw extruder. *Canadian Institute of Food Science and Technology Journal* 20(3); 1987; 148-153

This study reports the feasibility of groundnut protein texturization, by thermoplastic extrusion. Texturized products were produced by thermoplastically extruding defatted groundnut flour. Using response surface methodology the effects of three process parameters i.e., temp. (140 to 180 C), screw speed (60 to 90 p.p.m.) and feed moisture level (20 to 35%) on the physical properties of twin-screw thermoplastically extruded groundnut flour was evaluated. Results indicated that product bulk density, Warner-Bratzler shear, water absorption capacity and microstructure were influenced largely by process temp. and feed moisture. High temp., high feed moisture level and low screw speed enhanced production expansion and increased textural integrity. Careful manipulation of the three parameters, products with different characteristics could be obtained. BV

- 326 Anurag (C) and Geervani (P). Effect of heat processing on availability of lysine, methionine and tryptophan in selected varieties of groundnuts. *Nutrition Reports International* 36(1); 1987; 175-181

One traditional var. (local) and three high yielding var. (J-11, Kadiri 71-1 and TMV-2) of groundnut were processed by common household methods like boiling, roasting and deep fat frying. Total amino acids were determined in raw and processed samples. Available lysine was determined by the chemical method while available methionine and tryptophan were assayed microbiologically using *Streptococcus zymogenes*. No appreciable change was observed in the total amino acid content. Availability of lysine and methionine was lower than tryptophan. Loss in the availability of amino acids on dry heat processing was more than that of moist heat processing. AS

Soybeans

- 327 Monma (M), Fuchu (H), Sugimoto (T), Hashizma (K) and Saio (K). Inactivation mechanism of soybean lipoxygenase. *Journal of Japanese*

Society of Food Science and Technology '(Nippon Shokuhin Kogyo Gakkaishi') 34(3); 1987; 143-147 (Ja).

In order to make clear the inactivation mechanism of soybean lipoxygenase by homogenization, solubility of the precipitate prepared during homogenization, reaction behavior of SH residues, stabilities for SH reagents and effects of foaming on the inactivation, were investigated. The precipitate resulted from homogenization was presumed to be aggregated lipoxygenase which was polymerized by intermolecular S-S and the other bindings from the results of the solubility test with several solvents. A partial exposure of SH group in lipoxygenase was also recognized during homogenization. Lipoxygenase was stable on the treatments with oxidative reagents such like potassium bromate or blocking reagents such as N-ethylmaleimide, whereas unstable to reductive reagents such as 2-mercaptoethanol. Inactivation of lipoxygenase was highly accelerated by foaming and the inactivation was prevented by the addition of surfactants such as Triton X-100. Conclusively, it was suggested that lipoxygenase was inactivated by homogenisation and resulted in the precipitate through unfolding of the enzyme molecule and successive intermolecular S-S binding and additional polymerization by the other forces. Foaming during homogenization seemed to be the most dominant factor for the inactivation of soybean lipoxygenase by denaturation caused by surface tension. AS

- 328 Sheard (PR), Ledward (DA) and Mitchell (JR). Post-denaturational exothermic transition in soya isolate. *International Journal of Food Science and Technology* 22(2); 1987; 139-143

A previously unreported exothermic transition has been observed in soy isolate following the normal endothermic transitions associated with the denaturation of the 7S and 11S globulins. The concn. dependence of the peak temp. (T_m) and enthalpy (ΔH) of the transition has been investigated using differential scanning calorimetry. At high moisture contents ($> 90\%$) the enthalpy associated with the transition is large, compared to the denaturational enthalpy of the 7S and 11S globulins. There is little trace of the peak at moisture contents below 70%. AS

- 329 Suzuki (T), Yasui (A), Koizumi (H) and Tsutsumi (C). Application of hydrochloric acid extraction procedure to the determination of metal elements in soybean, green soybean and roasted soybean flour by atomic absorption spectrophotometry. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi') 34(3); 1987; 185-189 (Ja).

A method is described for the hydrochloric acid extraction of total potassium, magnesium, calcium, zinc, manganese, copper and iron in soybean, green soybean and roasted soybean flour. Homogenized sample was weighed in polypropylene bottle and 1 or 3% hydrochloric acid was added. After extraction for 1 h with occasionally shaking at room temp. or 72-80 °C, filtrate or supernatant was analysed by atomic absorption spectroscopy. The values obtained using this procedure were compared with those obtained after dry ashing method with platinum dish. The results are as follows: (1) K, Mg, Ca, Zn, and Mn in these samples were completely extracted with 1% hydrochloric acid at room temp. (2) Cu was completely extracted with 1% hydrochloric acid at 70 - 80 °C. (3) Above mentioned 6 elements were completely extracted with 3% hydrochloric acid at 70-80 °C, but extraction rate of iron was 90-95%. Hydrochloric acid extraction procedure was considered to be a rapid and simple method for preparing sample solution. AS

Soy proteins

- 330 Lopez de Ogara (MC), Pilosof (A (MR) and Bartholomai (GB). Effect of solutes in the hydration characteristics of soy protein isolate. *International Journal of Food Science and Technology* 22(2); 1987; 153-158

Hydration characteristics of soy protein isolate was studied in solutions containing salts or non-electrolytes used for food formulations. Addition of solutes to the hydration water decreased the hydration rate of the soy protein isolates. Hydration principles should be considered when soy isolates are used in solute-containing food systems (sausages, ground meat products, injection solutions for muscle augmentation or intermediate moisture foods). Prehydration of soy protein isolate in water before addition to food systems reduces mixing time. BV

TUBERS AND VEGETABLES

- 331 Uozumi (J), Kawano (S), Iwamoto (M) and Nishinari (K). Spectrophotometric system for the quality evaluation of unevenly coloured food. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi') 34(3); 1987; 163-170 (Ja).

A spectrophotometric system was designed and constructed to measure nondestructively visible reflectance spectra, as well as fluorescence spectra, of unevenly coloured food such as fruits and vegetables. It is in principle a single-beam spectrophotometer equipped with a large integrating sphere and operated with a microcomputer which controls wavelength scanning and data acquisition. The microcomputer provides also means of examining in detail relationship between colour of reflected light or fluorescence of food and various quality factors, such as maturity, constituents, damage, deterioration and so on. For this purpose, several data processing subroutines are involved in the program; reflectance spectra, absorbance spectra, running-average, SAVITZKY-COLAY'S smoothing differential spectra, difference spectra, areas of spectral peaks, summation of spectra, parameters of several colorimetric systems, multiple regression analysis and so on. As examples of measurement, visible reflectance spectra of several fruits and vegetables and fluorescence spectra of mandarin orange whose peel oil has been out of oil cell ruptured with a needle are shown. The visible reflectance spectra demonstrate the effectiveness of the differential processing of the second order. The fluorescence spectra show the examples of difference spectra processing. The performance and drawbacks of the present system are discussed. AS

Root vegetables

Carrots

- 332 Kalra (CL), Kulkarni (SG) and Berry (SK). The carrot (*Daucus carota* L.) - a most popular root vegetable. *Indian Food Packer* 41(6); 1987; 46-73

Under post-harvest technology the aspects covered include handling, quality criterion, marketing, storage under low temp. and controlled atm., prepackaging, physico-chemical changes during storage, effect of gamma irradiation and postharvest diseases and their remedies. The chemistry of carrot is reviewed covering protein/amino

acids, organic acids, lipids, volatile compounds, enzymes, carotenoids and others. The processes covered include effect of blanching/pretreatments/cooking on processing; canning, dehydration, freezing preservation, intermediate moisture carrot, and juice, preserve, puree, pie, flakes, halwa, chips and similar products from carrots. KAR

- 333 Mastrocola (D), Severini (C), Lerici (CR) and Sensidoni (A). Osmotic dehydration of carrot cubes. *Industrie Alimentari* 26(2); 1987; 133-138
- 334 Suzan Kincal (N) and Kaymak (F). Modelling dry matter losses from carrots during blanching. *Journal of Food Process Engineering* 9(3); 1987; 201-211

In these studies the mechanism of component losses from carrots during blanching was investigated by detn. of reducing sugars, sucrose, total soluble solids and total solids in raw and blanched samples of Nantes carrots. The samples were of 26 mm diameter, 26 or 60 mm long, with blanching temp. range of 65-100 C and time ranging 300-3600 Sec. using large amounts of well agitated water. The resulting values of the apparent diffusivities of each component determined separately at different temp. were found to correlate linearly or exponentially with temp. The order of magnitudes of the apparent diffusivities were found to be in good agreement with literature values (10^{-10} to 10^{-11} /m² /s⁻¹). NGKR

Cassava

- 335 Onayemi (O) and Oluwamukomi (MO). Moisture equilibria of some dehydrated cassava and yam products. *Journal of Food Process Engineering* 9(3); 1987; 191-200

The equilibrium moisture content for optimum stability of cassava and yam products were calculated using an equation from the moisture values. The results showed that the sorption properties for the above dehydrated products that were not precooked before drying were found to be similar and the optimum moisture for stability of the dried products lies between 6.5 - 8.0% under their marketing conditions. The storage studies confirmed that the poor keeping qualities of these products could be improved by further drying to moisture levels of 6.5 - 8.0% before packing in moisture proof containers. NGKR

Tubers

Potatoes

- 336 Baier (ED) and Pichert (H). Colour changes when cooking potatoes: A comparison of sensorially obtained results with those obtained by instrumental measurements. *Zeitschrift für Lebensmittel-Untersuchung und -Forschung* 185(3); 1987; 213-222 (De).

Potatoes can turn brown when stewed in a pressure cooker. The higher the pressure, the longer it takes for the potatoes to cook; the more sensitive the type of potato, the more they tend to turn brown. A comparison of the results obtained using a sensory test with those using light intensity values which are obtained by instrumental measurement showed good conformity. The relationship between sensorially obtained values and physical values can be shown in a regression line. It is thus possible to replace a sensory test with an instrumental method using colour measurements. AS

Sweet potato flour

- 337 Baba (T), Tamaru (Y), Kono (T) and Watanabe (A). Effects of microwave irradiation on amylolytic activities in dehydrated sweet potato flour. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi') 34(3); 1987; 178-184

The effect of microwave irradiation at 2450 MHz on dehydrated sweet potato flour were studied. Freeze dried sweet potato flour at various levels (moisture content: 10, 15, 20 and 25%) was irradiated at 180W for up to 480 sec. at intervals of 60 sec. It was demonstrated that microwave heating was effective in decreasing enzyme activities (Alpha amylase, Beta amylase). The rate of amylolytic enzyme inactivation was influenced by the initial moisture content of flour. Amylolytic enzyme in the flour with higher moisture content was inactivated by shorter irradiation. AS

Vegetables

Leafy vegetables

Cabbages

- 338 Buckenhuskes (H), Schwartz (B) and Gierschner (K). Changes in amino acid content during fermentation from white cabbage to sauerkraut. *Deutsche Lebensmittel-Rundschau* 83(10); 1987; 319-324

The changes in amino acids composition during spontaneous lactic acid fermentation of white cabbage to sauerkraut were investigated. 25 amino acid were detected in all samples except in few cases. Results indicated that some amino acids decreased during fermentation while the amount of other acids increased. BV

- 339 Hau (DY-Y), Beuchat (LR) and Brackett (RE). Comparison of media and methods for detecting and enumerating *Listeria monocytogenes* in refrigerated cabbage. *Applied and Environmental Microbiology* 53(5); 1987; 955-957

Direct plating, selective enrichment, and cold enrichment followed by secondary selective enrichment procedures were compared for detecting and enumerating *Listeria monocytogenes* in chopped cabbage stored, at 5 °C for up to 64 days. Addition of Fe^{3+} to solid media enhanced detection of the organism. Cold enrichment (5 °C) in nutrient broth and brain heart infusion broth followed by secondary enrichment (48 h, 30 °C) in Trypticase soy-yeast extract-antibiotic broth and thiocyanate-nalidixic acid broth and plating on selective agar media (Doyle and Schoeni selective enrichment agar [minus acriflavin hydrochloride, supplemented with 5 μ of Fe^{3+} ml] and McBride *Listeria* agar) resulted in the detection of highest population. AS

FRUITS

- 340 Giangiacomo (R), Torreggiani (D) and Abbo (E). Osmotic dehydration of fruit: Part 1. Sugars exchange between fruit and extracting syrups. *Journal of Food Processing and Preservation* 11(3); 1987; 183-195

In this paper the influence of type and concn. of sugars both in the fruit and in the syrup on sugars exchange has been determined by individually accounting for each sugar naturally present in the fruit as well as in the osmotic syrup. This study was carried out during

osmotic dehydration of cherry, apricot and peach using sugar syrup. Results showed that these sugar exchange dynamics between the syrup and the fruits was found to be related not only to the sugar flux from the syrup into the fruit but is also affected by the individual sugars originally present in the fruit, the species of the fruit and the relative diffusivity of the sugars and the enzymatic activity within the fruit. NGKR

Apples

- 341 Combrink (JC), Steenkamp (J) and Calitz (FJ). Post-harvest application of diphenylamine wettable powder and emulsifiable concentrate on starking apples. *Journal of Horticultural Science* 62(2); 1987; 141-146

In this study the effects and different DPA (diphenylamine) emulsifiable concentrate and wettable powder formulations on the DPA content of suspensions, DPA uptake and breakdown during storage, scald control, incidence of DPA injury and wet core rot of starking apples were determined. Starking apples harvested at three stages of maturity and inoculated by immersion with 50,000 conidia of *Penicillium expansum* ML⁻ were treated with chlorine thiabendazole (TBZ) and DPA (2 WP and 3 EC formulations) in a factorial experiment. The DPA content of each suspension was determined after treatment and DPA residues in fruit were regularly determined. After storage (5 months at -0.5 °C, 1 wk at 10 °C) superficial scald, DPA injury and wet core rot incidences were recorded. Fruit treated with WP decreased during treatment to 75% or less of the original concentration and fruit treated with WP has higher DPA residues than those treated with EC. DPA formulation did not affect the development of wet core rot and chlorine and TBZ decreased the incidence. Starking apples can be treated with DPA and EC without increasing the incidence of wet core rot. NGKR

- 342 De Pooter (HL), Van Aeker (MR) and Schamp (NM). Aldehyde metabolism and the aroma quality of stored golden delicious apples. *Industrie Alimentari* 26(1); 1987; 89-92

Aldehyde production by intact apples was monitored by reversed phase HPLC of headspace concn. after reaction with 2, 4-dinitrophenylhydrazine. Depending on the degree of maturity and their storage history, Golden delicious apple showed a variable headspace composition, differences being mostly a quantitative nature. Whereas the headspace of pre-climacteric fruits was particularly rich in C₁-C₆ aldehydes, that of climacteric ripening apples was greatly reduced, and some aldehydes were only present in trace amounts. Treatment of pre-climacteric or cold stored fruits with carboxylic acid vapours had a negligible effect on the aldehyde composition. Controlled atm. or cold storage, however, led to a notable increase in the aldehydes derived from the added carboxylic acids or from those shortened by Beta oxidation. This confirms the presence of reductive path of carboxylic acids into aldehydes. Further results suggest that high carbon dioxide (CA-storage) interferes with carboxylic acid metabolism and alcohol dehydrogenase activity, leading to a deterioration of the aroma quality. AS

- 343 Van Woensel (G), Wouters (A) and De Baerdemaeker (J). Relation between mechanical properties of apple fruit and sensory quality. *Journal of Food Process Engineering* 9(3); 1987; 173-189

The acceptability of apple fruit for the consumer was determined by measuring fruit texture using three methods. These were selected to do tests on Golden Delicious apples with differing acceptability

for the consumer. These three methods used were an uniaxial compression test on cylindrical fruit samples, resonance test on cylindrical apple specimen and a non-destructive dynamic test. The parameters found for correlating with the consumer acceptability were the apparent elastic modulus derived from the destructive dynamic test stiffness factor as well as the damping ratio at the spheroidal vibration mode of a whole apple derived from non-destructive dynamic tests. NGKR

Avocados

- 344 Amba Dan. Processed products of avocado and jackfruit. *Indian Horticulture* 32(3); 1987; 12-13

The processed products which are covered very briefly include preserve; and pickle from jackfruits and avocado. VKR

Citrus fruits

- 345 Watanabe (H), Hagura (Y), Ishikawa (M) and Sakai (Y). Cryogenic separation of citrus fruit into individual juice sacs. *Journal of Food Process Engineering* 9(3); 1987; 221-229

In this study four citrus fruits unshu orange, sweet orange, grape fruit and lemon were crushed by a falling ball type impact crusher at low temp. and their juice sacs were separated into individual sacs. The degree of separation was examined due to effect of freezing temp. and the results indicate that the degree of separation depended entirely on temp. regardless of sample size, applied force and kind of fruit and no shattering occurred above -30 °C. It was found that the degree of separation increased until below -120 °C, and there was no further separation. This was attributed to the mechanical property of juice. NGKR

Dates

- 346 Stegemann (H), Afify (AEMR) and Hussein (KRF). Identification of date (*Phoenix dactylifera*) cultivars by protein patterns. *Phytochemistry* 26(1); 1987; 149-153

The water-soluble proteins extracted from the soft tissue of ripe dates cvs Rciziz, Marzban, Mowahed, Kholass, Hatmy, Shishy, Shahi and Gir) collected in Saudi Arabia and one cv (Muskade) from Iraq were freed from some of their acidic polysaccharides by treatment with 33% propan 2-ol. The best protein separations and the most characteristic patterns with which to identify the cvs were obtained after poroPAGE or PAGIF, with both tube and thin-layer techniques. The native proteins showed characteristic M_r s in the range of 20, 22, 24 and 27 k and differentiation by isoelectric points either in range pH 4-5 or pH 8-9. The main subunits (M_r 25 and 85 k) were used for final discrimination in SDS-poroPAGE or in SDS-PAGE. AS

Litchi

- 347 Sharma (SB), Ray (PK) and Yadav (JP). Determination of maturity standard of litchi (*Litchi Lechinensis* Sonn.) Cv. Shahi. *Indian Food Packer* 41(6); 1987; 15-17

The physico-chemical characters (size, wt., sp. gr., aril%, soluble solids and acidity) of litchi cv. Shahi were determined from composite sample from 25 fruits. The fruits with 16.5 g wt., and sp. gr. > 1.0 with > 60% aril, having soluble solids content of 14.7% and

acidity 0.25% were considered optimal stage of maturity. Proper time for harvesting this var. is 58-65 days after fruit set. VKR

Mangoes

- 348 Teotia (MS), Manan (JK) and Saxena (AK). Green mango processing- a review. *Indian Food Packer* 41(6); 1987; 75-86

The review covers: composition; processing and products; raw mango powder; and lactic acid fermentation of mango including pickling and chutney preparation. VKR

- 349 Teotia (MS) and Pruthi (JS). Techno-economic aspects of 'Amchur' manufacture. *Indian Food Packer* 41(6); 1987; 26-30

Significant quality variations are observed in 'Amchur'- the dried or dehydrated peeled flesh of unripe, sour green mangoes-sold in the market. This report records the factors that are having a direct bearing on the cost of prepared Amchur like flesh recovery (60%), peeling and slicing capacity (15) Kg green mangoes/person/day), drying characteristics (drying ratio 7.5:1) sun-drying needs 16-18 h at 35 °C for complete drying of Amchur. As per the material balance sheet and project costing (which are given) the manufacturing cost of Amchur is Rs. 35-50/Kg. KAR

Muskmelons

- 350 Kalara (CL), Manan (JK), Surjan Singh and Tersem Lal). Studies on the suitability of muskmelon varieties grown in Punjab for canning. *Indian Food Packer* 41(6); 1987; 7-14

Four var. of muskmelon (Hara Madha, Fertile-I (MF), Punjab Suneheri and Punjab hybrid) were analysed for physico-chemical characteristics and canned in sugar syrup (32 Brix) with and without added ascorbic acid. Punjab Suneheri was found best for canning in respect of colour, texture, taste, flavour and could be stored for 6 months followed by Fertile-I (MF) which could be stored only for 4 months. VKR

Persimmon

- 351 Kon (M) and Shimba (R). Changes of carotenoids in Japanese Persimmon (Yotsumizo) during maturation, storage and drying process. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi') 34(3); 1987; 155-162

The distribution of carotenoids in the peel and the flesh of Japanese persimmon (*Diospyros kaki* Thumb. var. Yotsumizo) was studied using thin-layer chromatography. (1) Total carotenoid contents in the peel and the flesh increased during maturation, it was especially so just before the fully matured stage. At that stage Beta -carotene (24%) and cryptoxanthin (18%) in the peel, and cryptoxanthin (37%) in the flesh were predominant. The carotenoid level in the flesh was only 1/9 of that in the peel at the fully matured stage. (2) There was high correlation between carotenoid content and HUNTER'S chromatic "a" value. (3) Increase of carotenoids in the peel during the storage was due to the accumulation of Beta carotene, whereas lutein, antheraxanthin, zeaxanthin, violaxanthin and cis antheraxanthin decreased or disappeared. (4) After the drying process all of the 5, 6-epoxycarotenoid were isomerized to the 5, 8 epoxides. Lycopene and hydroxy-Alpha carotene newly appeared. (5) Chlorophyll content in the peel decreased during the maturation, but not completely disappeared.

Its content in the flesh was constantly about 1-3 of that in the fully matured peel throughout all the stages. The chlorophyll level did not change either in the peel or the flesh during the storage. AS

Plums

- 352 Komiyama (Y). Biochemical studies on keeping quality and utilization of plum fruit. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi') 34(3); 1987; 203-210 (Ja).

Strawberries

- 353 Singh (RP) and Wells (JH). Monitoring quality changes in stored frozen strawberries with time-temperature indicators. *International Journal of Refrigeration* 10(5); 1987; 296-300

Commercially available time temp. indicators were examined as quality change monitors for frozen strawberries during storage. Strawberries were stored under constant (-12, -18 and -35 C) and variable temp. treatments, and quality changes evaluated at three wk intervals by sensory and chemical analysis methods. Indicator response was strongly correlated with firmness and ascorbic acid change in strawberries stored -12 C. AS

CONFECTIONERY, STARCH AND SUGAR

Confectionery

- 354 Tabourat (T). Detection of fat migration in a confectionery product. *International Journal of Food Science and Technology* 22(2); 1987; 163-167

Fat migration in a confectionery product is determined using electron spin resonance (ESR) due to its high sensitivity. Gas liquid chromatography has been applied for detn. of fatty acid distribution for migration in the confectionery industry. In dragees, the fat of the milk chocolate centre migrated to some degree into the sugar coating. The migration increased with the addition of milk fat to milk chocolate. Unsaturated acid (oleic and linoleic) and shorter chain acids (C less than or equal to 14) migrated more than saturated ones (Palmitic, stearic). BV

Sugar

- 355 Jermini (MFG), Geiges (O) and Schmidt-Lorenz (W). Detection, isolation and identification of osmotolerant yeasts from high-sugar products. *Journal of Food Protection* 50(6); 1987; 468-472

A new method for developed was detecting "low-level" contamination, isolation and identification of osmotolerant yeast from high sugar products. MVG

BAKERY PRODUCTS

- 356 Anon. Radio frequency post-baking controls moisture in cookies, biscuits, snacks. *Milling & Baking News* 66(16); 1986; 32, 34

Advantages of using radio frequency for post-baking food

products (biscuits, crisp bread, breakfast food, etc) is considered. By radio frequency production can be increased by up to 50%. Savings can be achieved on energy, space and buildings. Automatic moisture leveling and control of product colour and moisture content both internally and externally is possible. Less breakage during filling and packaging operations, better textures are achieved with the elimination of the 'center bone' dense dough centre of cookie products; improvement in taste is also seen. BV

- 357 Spooner (TF). Design for continuous freezing systems depends on knowing how products react. *Milling & Baking News* 66(16); 1986; 40, 42, 43, 45

Reviews the basics of heat transfer, freezing characteristics of a few typical bakery products and basic refrigeration systems. BV

Biscuits

- 358 Vatsala (CN) and Haridas Rao (P). On factors affecting the acidity of soft dough biscuits. *Journal of Food Science and Technology, India* 24(6); 1987; 286-288

Studies on acidity of extracted fat, one of the criteria used for evaluating biscuit quality, showed that in addition to major ingredients like flour and fat, minor ingredients like corn syrup, milk powder and baking chemicals considerably influenced the acidity of soft dough biscuits. Incorporation of 3% corn syrup and 2% nonfat dry milk solids increased the acidity to 0.49 and 0.48% resp. from 0.37% observed for control biscuits without these ingredients. Addition of baking chemicals reduced the acidity of biscuits from 0.86 to 0.42%. Sodium bicarbonate reduced the acidity to max. increasing the baking temp. from 175 to 260 C, increased the acidity from 0.35 to 0.73% while increasing the baking time from 12 to 21 min increased the acidity from 0.38 to 0.86%. Acidity in biscuits increased from 0.42 to 0.57% during storage for 4 months. AS

Bread

- 359 Al-Mohizea (IS), Mousa (EI) and Fawzi (NM). Microbiological studies on two common types of bread in Saudi Arabia. *Cereal Foods World* 32(9); 1987; 610-612

Samples of two types of bread widely consumed in Saudi Arabia were collected from 15 semiautomatic commercial bakeries. The mold free shelf life and the mold genera responsible for bread spoilage were studied. Plate counts indicated that the initial microbial loads were low in the majority of samples. Furthermore, no significant correlations ($P < 0.05$) were observed between the initial counts and the mold free shelf lives whereas wide variation existed in mold free shelf lives among bread samples from different bakeries. Mafrud (pita-type) bread, in general, exhibited a better microbial keeping quality than Samouli (French-type) bread. *Penicillium* predominated over all other mold genera in breads stored at refrigerator temp, followed by *Neurospora*, whereas at room temp. *Penicillium* and *Aspergillus* predominated, followed by *Rhizopus* and *Neurospora*. AS

- 360 Mario Gaiani and Enrico Vezzani. Comparison among the oil absorption capacity in the different food preparation for breading. *Industrie Alimentari* 26(2); 1987; 127-132

Presents the comparison among the different oil absorption capacity during the frying process for the various food preparations for

breeding (bread crumbs). BV

- 361 Mousa (EI) and Al-Mohizea (IS). Bread baking in Saudi Arabia. *Cereal Foods World* 32(9); 1987; 614, 616, 618, 620

Reviews the present status of the baking industry in the Kingdom of Saudi Arabia. The technological aspects and physical characteristics of some bread widely consumed in Saudi Arabia were investigated. Information regarding the formula, breadmaking technology, and physical characteristics of Samouli, Mafrud, Tannouri, Burr, Tammeses, and Korsan type of bread is presented. BV

Cakes

- 362 Sych (J), Castaigne (F) and Lacroix (C). Firming data analysis of layer cakes during storage. *Canadian Institute of Food Science and Technology Journal* 20(3); 1987; 154-161

An experiment was carried out to evaluate the effects of cake initial moisture content and storage relative humidity on layer cake firming during storage at 20°C. Cake firming data, from crumb compressibility measurements, were analyzed by fitting two equations which have previously been used in bread staling investigations. Firming rates, limiting firmness and total changes in firmness were estimated and the adequacy of the fittings were evaluated by analysis of variance. Results indicate that cake moisture loss did not account for all increase in cake firming and that secondary firming processes may intervene. Cake initial moisture content appears to affect the type of firming behaviour occurring. AS

Tortillas

- 363 Hernandez (M) and Sotelo (A). Protein quality of masa and tortillas supplemented with chickpea. *Nutrition Reports International* 36(1); 1987; 213-221

The effect on the chemical composition and protein quality of tortillas prepared with corn supplemented with chickpea in different proportions was investigated. The addition of chickpea to corn was performed in two different ways. (a) Replacing 10 to 30% in wt. of commercial lime treated corn flour, by cooked chickpea flour and b) the same percentage as in (a) of raw chickpea in grain added to the corn before the lime-cooking treatment. Protein, fat and ash increased in the supplemented tortillas. The highest PERs were obtained when raw corn and chickpea together were lime treated and with the 80:20 corn:chickpea proportions. The acceptability of supplemented tortillas was similar to that of the control. AS

MILK AND DAIRY PRODUCTS

- 364 Chen (JH) and Zall (RR). Packaged milk, cream and cottage cheese can be monitored for freshness using polymer indicator labels. *Dairy and Food Sanitation* 7(8); 1987; 402-404
- 365 Lohrey (EE). The effects of oxidized lipid on the biological measurement of quality of animal and vegetable proteins. *New Zealand Journal of Dairy Science and Technology* 22(2); 1987; 131-142

Milk

- 366 Aishima (T), Yada (RY), Mohler Smith (A) and Nakai (S). Multivariate analysis of structure-related data to explain milk clotting activity of proteolytic enzymes. *Journal of Food Biochemistry* 11(2); 1987; 121-132

The relationships between milk clotting activity and physico-chemical properties such as CD spectra, hydrophobicity and zeta potential of ten proteolytic enzymes at six different pH values was investigated using multivariate analysis. Classification of the enzymes into three groups i.e, enzymes with high, medium and low milk clotting activity was achieved by discriminant analysis after adding the ratio of secondary structure parameters to the predictor variables. The results showed that β -sheet, β -turn and random structure features were important milk-clotting activity. NGKR

- 367 D'Aoust (J-Y), Emmons (DB), McKellar (R), Timbers (GE), Todd (ECD), Sewell (AM) and Warburton (DW). Thermal inactivation of *Salmonella* species in fluid milk. *Journal of Food Protection* 50(6); 1987; 494-501

The thermal resistance of *Salmonella senftenberg* 775W, *Salmonella muenster* previously isolated from raw fluid milk, and two mixtures each consisting of ten *Salmonella* strains commonly isolated from human or non-human sources was tested. Cells were suspended in whole milk at a final concn. of 10^5 cells/ml. The inoculated milk was thermally processed at temp. ranging from 60 °C to 74 °C using a pilot-scale plate pasteuriser unit. The mean and min. residence time of milk in the holding tube of the pasteurizer was 17.6 and 16.2 s, resp. The max. temp. at which viable salmonellae were detected in the human (61.5 °C) and non human (64.5 °C) mixture was considerably lower than that obtained with *S. senftenberg* 775 W (67.5 °C). *S. muenster* failed to show any milk-adopted response and could not be recovered at temp. greater than 63.0 °C. Treatment at 63 °C produced a 4 Log₁₀ or greater reduction in the number of viable salmonella including the heat resistant *S. senftenberg* 775 W, and a min. 2 Log₁₀ decrease at 60 °C. These findings warrant caution in the use of sub-pasteurizing temp. for thermal processing of fluid milk. AS

- 368 Prasad (C) and Balachandran (R). Effect of chemical additives on pH and heat stability of buffalo milk at different levels of concentration. *New Zealand Journal of Dairy Science and Technology* 22(2); 1987; 123-130

Buffalo milk was vacuum concentrated to 25, 30 and 35% total solids and the effect of stabiliser, gelling agent and emulsifying agent on the pH and high conglutination time (HCT) was studied. MVB

- 369 Rosenow (EM) and Marth (EH). Growth of *Listeria monocytogenes* in skim, whole and chocolate milk, and in whipping cream during incubation at 4, 8, 13, 21 and 35 °C. *Journal of Food Protection* 50(6); 1987; 452-459

The growth rate of *L. monocytogenes* was similar in all four products at a given incubation temp. and increased with increasing incubation temp. Doubling time over all products and strains were 41 min (35 °C), 1 to 43 min - 1 h 35 min (21 °C), 4 h 2.7 min - 6 h 55 min (13 °C), 8 h 40 min - 14 h 33 min (8 °C) and 29 h 44 min - 45 h 33 min (4 °C). In some case instance the max. population reached were atleast 10^7 cells/ml with highest numbers consistently produced in chocolate milk. Extended storage at the given incubation temp. caused

little decrease in final number. MVG

Milk products

Butter

- 370 Krishnamurthy (N) and Sampathu (SR). Application of garcinol as a colourant for butter and ghee and method of its estimation. *Journal of Food Science and Technology, India* 24(6); 1987; 312-313

Garcinol, a light yellow fat-soluble pigment, isolated from the rind of kokum fruit *Garcinia indica* was evaluated as a colourant in butter. To estimate garcinol added to butter, spectrophotometric method was standardised. Addition of the pigment at 0.3% level imparted an acceptable yellow colour to butter. It was retained upto 98.4% for 90 days storage at 4 °C and 99.0% after 15 days storage at 25 °C. The added garcinol was retained upto 94% when butter was heated to ghee. MVG

- 371 MacGibbon (AKH) and McLennan (WD). Hardness of New Zealand patted butter: Seasonal and regional variations. *New Zealand Journal of Dairy Science and Technology* 22(2); 1987; 143-156

Cheese

- 372 Aworth (OC), Adedeji (BA) and Nwanekezi (EC). Effect of partial substitution of cow's milk with soy milk on yield and quality attributes of West African soft cheese. *International Journal of Food Science and Technology* 22(2); 1987; 135-138

Possibility of replacing part of cow's milk with less expensive soy milk in the production of Warankasi (a soft unripened cheese in less developed parts of the world) is considered. Cheeses were obtained from soy milk prepared by grinding soybeans in boiling water (95-100 °C, for 15 - 20 sec.). Cheeses containing soy milk were comparable with controls made from whole cow's milk in yield, nitrogen and fat content, and flavour. Cheeses with up to 10% soy milk had slight brownish colour, but were acceptable. Cheeses with 20% soy milk were inferior to controls although acceptable. BV

- 373 Jarvis (AW). Sources of lactic streptococcal phages in cheese plants. *New Zealand Journal of Dairy Science and Technology* 22(2); 1987; 93-103

Data is presented on phages attacking *Streptococcus cremoris* starter strains. The possible roles of raw milk of lysogenic lactic streptococci and of the other lactic phages in the appearance of new phages in cheese plants were also investigated. MVG

- 374 Lucisano (M), Pompei (C) and Casiraghi (F). Texture evaluation of some Italian cheeses by instrumental texture profile analysis. *Journal of Food Quality* 10(2); 1987; 73-89

This study reports the results of rheometric characteristics of typical Italian cheese in order to determine the most suitable conditions for the performance of Texture Profile Analysis (TPA). These measurements for hardness, energy, cohesiveness, springiness, gumminess and chewiness were performed on 20 mm cubic specimens at 20 °C. It is found possible to fingerprint any type of cheese by carrying out TPA under two different sets of operating conditions and their processing the data by quantitative descriptive analysis and this finding may contribute to a better definition of typical local cheese.

NGKR

- 375 Polonelli (L), Morace (G), Rosa (R), Castagnola (M) and Frisvad (JC). Antigenic characterization of *Penicillium camemberti* and related common cheese contaminants. *Applied and Environmental Microbiology* 53(4); 1987; 872-878
- 376 Potgieter (AP), Mostert (JF), Downes (TEH) and De Haast (J). Demineralization of cheese whey using an ammonium bicarbonate process. I. Evaluation of different resins. *New Zealand Journal of Dairy Science and Technology* 22(2); 1987; 111-121

Paneer

- 377 Sachdeva (S) and Singh (S). Use of non-conventional coagulants in the manufacture of paneer. *Journal of Food Science and Technology, India* 24(6); 1987; 317-319

Paneer (an indigenous milk product prepared by acid and heat coagulation of milk) was prepared by using non-conventional, low cost coagulants, namely 0.6% solution of HCl or phosphoric acid and acidophilus whey as substitutes for conventional high cost citric acid. HCl was the most economical among the chemical coagulants. The paneer production can also be economised by replacing citric acid completely with acidophilus whey with which the yield and quality are both superior. KAR

Whey

- 378 Gray (RM) and Mackenzie (DDS). Effect of plane of nutrition on the concentration and yield of whey proteins in bovine milk. *New Zealand Journal of Dairy Science and Technology* 22(2); 1987; 157-165

Milk proteins

Casein

- 379 Carlson (A), Hill (CGJr) and Olson (NF). Kinetics of milk coagulation: II. Kinetics of the secondary phase: Micelle flocculation. *Biotechnology and Bioengineering* 29(5); 1987; 590-600

A kinetic model for the agglomeration of milk micelles following K-casein hydrolysis is described. The key features of the model are: (1) the surface potential of casein micelles is sufficient to explain the colloidal stability of the milk system; (2) the reduction in surface potential following K-casein hydrolysis explains the loss of stability; (3) partial hydrolysis leads to limited agglomeration; and (4) the kinetics of agglomeration are compatible with the theory that completely hydrolyzed micelles have only a limited number of interaction sites. The model accurately predicts solution turbidity increase assuming that micelles have only circa 1.2 interaction sites on the average under the experimental conditions of this study. AS

- 380 Carlson (A), Hill (CGJr) and Olson (NF). Kinetics of milk coagulation: I. The kinetics of Kappa casein hydrolysis in the presence of enzyme deactivation. *Biotechnology and Bioengineering* 29(5); 1987; 582-589

The kinetics of the primary phase of the enzymatic coagulation of milk, i.e., K-casein hydrolysis, was investigated in the presence and in the absence of concurrent enzyme deactivation processes. For conditions under which the enzyme is stable, the rate of hydrolysis can be described by Michaelis-Menten kinetics, as has been reported by

previous investigators. A mathematical model, experimental data, and parameter estimates are provided for K-casein hydrolysis in the presence of concurrent deactivation of enzyme. The model accurately describes the experimental results when porcine pepsin was used as the renneting enzyme. The model and the experimental results indicate that samples of milk treated under conditions where deactivation of enzyme is significant can have fractional conversions of K-casein ranging from zero to unity and yet contain no active enzyme at the termination of the treatment. AS

- 381 Carlson (A), Hill (CGJr) and Olson (NF). The kinetics of milk coagulation: IV. The kinetics of the gel-firming process. *Biotechnology and Bioengineering* 29(5); 1987; 612-624

A mechanistic kinetic model of gel firmness development during milk gel formation is presented. The model correctly accounts for the influence of enzymatic k-casein hydrolysis on the rate of firmness development in renneted milk gels. The model used is based on two first order reactions occurring in series. The first reaction is enzymatically controlled and corresponds to the formation of gel crosslink sites by K-casein hydrolysis. The second reaction is non enzymatic and corresponds to the process of crosslink formation and depletion of active sites. The model successfully predicts gel firmness development in the temp. range 31 - 45 C for a var. of initial enzyme concn. AS

MEAT AND POULTRY

Meat

- 382 Ailsup (TN). A comparison of the agar gel immuno-diffusion (AGID) and counter-immunoelectrophoresis (CIE) tests for species identification of imported red meat and offal. *Meat Science* 20(2); 1987; 119-128
- 383 Anon. Prevention of meat toughness: A description of some of the research that has been undertaken to overcome the problems of meat toughness. *British Food Journal* 89(93); 1987; 36-37
- 384 Bijker (PGH), Van Lgtestijn (JG) and Mossel (DAA). Bacteriological quality assurance (BQA) of mechanically deboned meat(MDM). *Meat Science* 20(4); 1987; 237-252

Bacteriological quality assurance(BQF) of mechanically deboned meat (MDM), from one plant was monitored. During the investigation occasional high colony counts of *S. aureus* were observed in poultry and pork MDM. Hence, both biotyping and assessment of enterotoxin formation was carried out in order to obtain more precise insight into the fate of MDM and devise measures during managements of health risks for the consumer. MVG

- 385 Brach (EJ), Fagan (WE) and Raymond (DF). Instrument for grading veal carcasses. *Journal of Food Quality* 10(2); 1987; 91-99

The important characteristic in veal grading is colour and in this paper an instrument which is a commercially altered, light wt. and portable has been discussed. The colour is expressed in X, Y and portability. Coordinates and illuminance Y value and is measured by chromaticity. Coordinates and illuminance Y value and is measured by placing on the carcass the colour meter and the reflected light from the meat is detected in three detectors, each detector provided with a different red, green and blue filters. By a microprocessor these

values are calculated and the instrument is provided* with a calibration chart and is battery operated which can be recharged. NGKR

- 386 Cantoni (C), Milva (E) and Bazzani (M). Formaldehyde contents in foods of animal origin *Industrie Alimentari* 26(2); 1987; 123-126, 132

Reports the presence of natural free formaldehyde contents in foods of animal origin. BV

- 387 Howell (NK) and Lawrie (RA). Functional aspects of blood plasma proteins. V. Viscosity. *International Journal of Food Science and Technology* 22(2); 1987; 145-151

The viscosity of solutions (6% W/W protein in 45% sucrose) of porcine bovine whole blood plasma, serum and porcine plasma fractions exhibited Newtonian behaviour between 20 and 73 °C. On further heating, the viscosity of these solutions increased exponentially producing a reversible gel structure at 76 °C and an irreversible gel at 79 °C. In contrast egg albumin, protein solutions indicated relatively low initial viscosity but started to thicken at 65 °C, forming reversible gels at 73 °C and irreversible gels at 76 °C. The viscosity of the egg albumen proteins solutions was similar to that of the serum proteins and plasma protein fractions and less than that of whole plasma protein solutions. Viscosities lower than expected were exhibited by mixtures of whole porcine or bovine plasma and egg albumen proteins. However, synergistic interaction between the proteins of egg albumen and porcine plasma fraction I and fraction III (albumin) and porcine serum occurred at high temp. of heating. AS

- 388 Locker (RH). The non-sliding filaments of the sarcomere. *Meat Science* 20(3); 1987; 217-236

A model is proposed for the gap or third filaments of muscle here renamed T-filaments. These consist of single titin molecules, spanning the half sarcomere from M-line to Z-line. Of several possibilities for stoichiometry and arrangement, the one most favoured here consists of six T-filaments lying longitudinally on the surface of the A-filament, one against each peripheral subfilament of myosin. C-protein molecules over-lie the T-filaments in transverse and axial rows, with their long axes following a helix. Each C protein molecule helps to bind a pair of T-filaments to one A-strand (but not to bind A-strands together), and hinders the immune response of titin in the C-zone. The gap filaments arise from the coalescence of T-filaments in the I-band, and their extreme extensibility from an unravelling of a beaded structure in the titin molecules. A layout is presented for the molecule in zones of configuration and function. Possible arrangements of the T-filaments in the M- and N₂ zones are discussed. AS

- 389 Okrend (AJG), Rose (BE) and Bennett (B). Incidence and toxigenicity of *Aeromonas* species in retail poultry, beef and pork. *Journal of Food Protection* 50(6); 1987; 509-513

Methods for isolation of *Aeromonas* from meat and poultry products were evaluated, and a survey of retail beef, poultry and pork for the presence of the organism was conducted. These *Aeromonas* isolated were tested for ability to produce cytotoxin, haemolysis and cholera life toxin. MVG

- 390 Padda (CS), Sharma (BD) and Sharma (N). Oxidative discolouration and rancidity in meat—a review. *Indian Food Packer* 41(6); 1987; 31-45

Development of oxidative rancidity and discolouration in meat

and its products during storage and marketing results in huge economic losses. This review attempts to cover various aspects of such rancidity and discolouration under the topics oxidative discolouration; rancidity and co-oxidation; warmed over flavour; cured meats; prevention of auto-oxidation and research needs. KAR

- 391 Sherikar (AT), Khot (JB), Jayarao (BM) and Pillai (SR). Species differentiation in raw and heat treated meats using serological methods (agar gel precipitation tests). *Journal of Food Science and Technology, India* 24(6); 1987; 293-299

Attempts were made to study the application of agar gel precipitation test by considering the spectra of the precipitation lines and further its application to meats heated to 70 °C and 100 °C using rabbit antisera to raw and heat treated meats. The antisera reacted with raw and heated (70 °C) meat extracts producing a spectrum of sp. specific precipitation bands which enabled their identification. Cross reactions were observed between related sp. but antipoultry sera and antisera to heated pork gave only sp. specific reactions. When tested against extracts of heated (70 °C) and raw meats antisera showed weak reactions with minor variation. No antibodies were produced nor there was any reaction with antisera when tested against boiled (100 °C) meat extracts and hence could not be identified after pathopal concn. Antisera to raw meats stored at 20 °C for 9 y. were also found to be competent. MVG

Beef

- 392 Johnson (ER). Marbling fat in beef. *Meat Science* 20(4); 1987; 267-279
- 393 Lunt (DK) and Orme (LE). Feedlot performance and carcass evaluation of heifers fed finishing diets as weanling calves or as yearlings. *Meat Science* 20(2); 1987; 159-164
- 394 Marriott (NG), Carpenter (ZL), Smith (GC) and Hoke (KE). Quality of reassembled and gas-flushed steaks with variations in packaging and display time and temperature. *Canadian Institute of Food Science and Technology Journal* 20(3); 1987; 143-147

Short loins and round tips from 16 paired sides of beef were cut into steaks, reassembled as subprimals, bagged and cuts from one side were packaged in a vacuum chamber. Counterpart cuts were gas-flushed and vacuum packaged. All cuts were stored for 14 days with subsequent packaging as retail cuts. Retail packaged were stored at 0 °C from 0 - 7 days or displayed from 0 - 9 days at two different temp. Flavour, juiciness, overall satisfaction, purge loss and wt. loss of vacuum packaged reassembled subprimals and retail cuts that were gas-flushed and vacuum packaged did not differ ($P > 0.05$). Microbial load tended to increase as time and display temp. increased, whereas appearance deteriorated. Subjective appearance ratings were not closely related to sensory traits, purge loss or wt. loss. These data suggest that pre-cut steaks may be stored as reassembled subprimals vacuum packaged or gas-flushed and vacuum packaged for 14 days with an ultimate case-life that is acceptable. AS

- 395 Marriott (NG), Phelps (SK) and Graham (PP). Restructured beef and turkey steaks. *Journal of Food Quality* 10(4); 1987; 245-254

This study was carried out to evaluate the turkey dark meat to be incorporated in beef formulations and sugar as a flavour adjunct to reduce the fat content in order to improve the functional properties and sensory qualities of restructured steaks. The results of study

suggested that the quality is affected more by storage than the raw materials and the flavour adjuncts but more discoloration was noted among the formulations more than 50% turkey dark meat. The effects of turkey dark meat and sugar incorporation were minimal thoughsteaks containing them tended to have higher TBA values. NGKR

- 396 Miller (MF), Davis (GW), Williams (ACJr), Boyd Ramsey (C) and Galyean (RD). Acceptability of beef patties extended with pork and or textured soy protein. *Journal of Food Quality* 10(2); 1987; 117-122

This study has been carried out to compare palatability and visual traits of beef/pork, beef/pork/textured soy protein TSP and beef/textured soy protein. Four beef or beef/pork ground meat blends were extended with textured soy protein at 0, 10, 20 and 30% levels. Sensory evaluation for flavour and overall desirability showed that a beef blend containing 50% beef and 30% pork and no TSP was rated highest than blends with TSP and a distinct advantage for palatability was indicated in the beef/pork blends without TSP. NGKR

- 397 Seideman (SC), Koohmaraie (M) and Crouse (JD). Factors associated with tenderness in young beef. *Meat Science* 20(4); 1987; 281-291

- 398 Smith (GC), Savell (JW), Cross (HR), Carpenter (ZL), Murphey (CE), Davis (GW), Abraham (HC), Parrish (FCJr) and Berry (BW). Relationship of USDA quality grades to palatability of cooked beef. *Journal of Food Quality* 10(4); 1987; 269-286

- 399 Trout (GR) and Schmidt (GR). The effect of cooking temperature on the functional properties of beef proteins: The role of ionic strength, pH, and pyrophosphate. *Meat Science* 20(2); 1987; 129-147

- 400 Vanderzant (C), Savell (JW), Hamby (PL), Acuff (GR), Cox (NA) and Bailey (JS). Indole-induced, green to brown-black pigment formation by an *Acinetobacter* strain from beef. *Journal of Food Protection* 50(6); 1987; 485-486

In determining aerobic plate counts on surfaces of beef carcasses, green to brown-black colonies of an *Acinetobacter* sp. appeared on tryptic soy agar plates. Pigmentation was induced by indole-producing organisms in close proximity of or overlapping with the *Acinetobacter* sp. Addition of indole to culture media also support pigmentation of the *Acinetobacter* sp. indole appeared to be a key intermediate compound in pigment formation. AS

Bovines

- 401 Dreiling (CE), Brown (DE), Casale (L) and Kelly (L). Muscle glycogen. Comparison of iodine binding and enzyme digestion assays and application to meat samples. *Meat Science* 20(3); 1987; 167-177

- 402 Lakritz (L), Carroll (RJ), Jenkins (RK) and Maerker (C). Immediate effects of ionizing radiation on the structure of unfrozen bovine muscle tissue. *Meat Science* 20(2); 1987; 107-117

- 403 Park (JW), Lanier (TC), Swaisgood (HE), Hamann (DD) and Keeton (JT). Effects of cryoprotectants in minimizing physicochemical changes of bovine natural actomyosin during frozen storage. *Journal of Food Biochemistry* 11(2); 1987; 143-161

The effect of cryoprotectants in protecting the myofibrillar proteins of pre-rigor beef against denaturation and/or aggregation during frozen storage has been investigated in this paper. The physi-

cochemical changes in bovine natural actomyosin extracted from prerigor semimembranous muscle were investigated during frozen storage at -28°C as affected by the addition of cryoprotectants like 5.6% polydextrose or 5.6% mixture (1:1) of sucrose and sorbitol. Various effects like protein destabilisation decrease in protein solubility, visual appearance of aggregates in protein solution, decrease in intensity of flow birefringence intrinsic viscosity and changes in size and shape etc., were reduced to some extent by the above cryoprotectant treatments. NGKR

Mutton

Goat

- 404 Gigiel (A) and Creed (PG). Effect of air speed, temperature and carcass weight on the cooling rates and weight losses of goat carcasses. *International Journal of Refrigeration* 10(5); 1987; 305-306

This paper provides data on the cooling time in the deep leg and shoulder of goat carcasses (5, 10 and 20 Kg in wt.) in air velocities of 0.5, 1 and 3 m s^{-1} . The analysis has been carried out to enable cooling item predictions to be made for any air temp. that avoids surface freezing. There was no significant difference in wt. loss (average 2.48% over 23 H) for different values of carcass wt. or air velocity. AS

- 405 Reddy (KS) and Mandokhot (UV). Studies on sulphur dioxide treatment of minced goat meat. I. Effect on storage life and organoleptic qualities. *Journal of Food Science and Technology, India* 24(6); 1987; 299-303

Minced goat meat were treated with sodium disulphide to get 300, 450 and 600 p.p.m. of sulphur dioxide and in another experiment to get sulphur dioxide concn. of 375, 400, 425 and 450 p.p.m. Bacteriological stability and eating quality of the sulphur dioxide treated minced goat meat was done from 70°C and 15°C stored (13 days) samples. Sulphur dioxide (425 and 450 p.p.m.) conferred max. bacteriological stability and thus gave increased storage life. No adverse effect on eating quality and odour of the meat as a result of sulphur dioxide treatment was observed. It was also indicated sulphur dioxide was a good colour fixative agent. MVB

Sheep

Lamb

- 406 Thompson (JM), O'Halloran (WJ), McNeill (DMJ), Jackson-Hope (NJ) and May (TJ). The effect of fasting on live weight and carcass characteristics in lambs. *Meat Science* 20(4); 1987; 293-309

Two experiments were conducted to quantify the pattern of live wt., carcass wt. and fat loss in lambs fasted upto 4 days. Effects of sex, live wt. and fat score on these patterns were examined. In the second experiment, which was essentially a replicate, additional treatments were carried out to examine the effect of weaning and transport on live wt. and carcass loss. Result showed that loss in % live wt. and carcass wt. with fasting was curvilinear with greater losses occurring in the initial periods of the fast. Also fasting was associated with losses in carcass fatness. There was an interaction between rate of loss in live wt. carcass wt. and fatness with fasting, on initial fat score and such lambs with lower fat score lost greater percentage of live wt., carcass wt. and fat depth during fast-

ing. MVG

Pork

- 407 Marriott (NG), Phelps (SK), Costello (CA) and Graham (PP). Restructured pork with flavour enhancers. *Journal of Food Quality* 10(2); 1987; 107-115

Research has been conducted to compare three flavour enhancers in restructured mutton chops prepared from muscles removed from pork shoulders at 24 h post mortem with product without any flavour enhancers. The flavour enhancers included in the formulation were 0.5% mushroom extract, 0.38% Globe Natural Potentiator, 0.38% monosodium glutamate. Samples were evaluated for discoloration, cohesiveness, muscle cut resemblance overall appearance, juiciness, connective tissue amount, tenderness, and flavour at 0, 14, and 56 days after packaging. The objective evaluations included colour and TBA (Thiobarbituric acid) values. Results showed that samples with MSG sustained less discolouration after storage for 42 days than the M and NP chops, similar effects on overall appearance scores were noted. All flavour enhancers had a minimal effect on the above parameters. The M and NP provided more flavor protection than MSG. NGKR

- 408 Silas (JC), Carpenter (JA) and Harrison (MA). Microbial profile of spoilage flora from pork sausage stored under three different cooler conditions. *Journal of Food Quality* 10(4); 1987; 265-268

This study has been carried out to determine the types of bacteria present in fresh pork sausage held under three different storage environments when found to be unacceptable for retail sale as determined by the development of an off colour. A microbial examination was made of pork sausage stored until off colour development in three cooler arrangements viz. retail display case, walk in cooler and walk-in-cooler with incandescent illumination. Ninety mesophilic and ninety psychrotropic organisms were isolated from the above sausages. The isolates have been identified by standard tests. The results revealed that the predominate psychrotropic isolate for all storage conditions was *Pseudomonas* and comprised 58%. *Lactobacillus* was the predominating organism from samples stored under walk-in-cooler conditions whereas equal numbers of lactobacilli and enterobacteriaceae were found in samples stored in retail display case. NGKR

Pigs

- 409 Monin (D), Mejenes-Quijano (A), Talmant (A) and Sellier (P). Influence of breed and muscle metabolic type on muscle glycolytic potential and meat pH in pigs. *Meat Science* 20(2); 1987; 149-158

Swine

- 410 Water (CVD), Haagsma (N), Van Kooten (PJS) and EdenW (V). An enzyme-linked immunosorbent assay for the determination of chloramphenicol using a monoclonal antibody. Application to residues in swine muscle tissue. *Zeitschrift für Lebensmittel-Untersuchung und -Forschung* 185(3); 1987; 202-207

A competitive enzyme-linked immunosorbent assay (ELISA) using a monoclonal antibody is described for the detn. of chloramphenicol (CAP) residues in swine muscle tissue. The limit of detection of standard solutions is established to be $25 \text{ ng ml}^{-1} = 2.0 \text{ ng CAP per well}$. The very high specificity of the monoclonal antibody for CAP is expressed by the insignificant cross-reactivity with other antimicro-

bial agents and with structurally related compounds. By means of the rapid sample preparation method described earlier for the CAP detn. using high performance liquid chromatography (HPLC), residue levels CAP in swine muscle tissue above $5 \mu\text{kg}^{-1}$ can be easily quantitated. The muscle samples show good recovery percentages at 10-50 μkg^{-1} spiking levels. The results obtained by the ELISA method were confirmed by HPLC. AS

Meat products

- 411 Dincer (B), Spearow (JL.), Cassens (RO) and Greaser (ML). The effects of curing and cooking on the detection of species origin of meat products by competitive and indirect ELISA techniques. *Meat Science* 20(4); 1987; 253-265
- 412 Kang ethe (EK) and Lindqvist (KJ). Detection of beef and pork in fresh and heat treated meat products using enzyme immunoassay. *Journal of Food Science and Technology, India* 24(6); 1987; 289-293

Raw and heat-treated pork and beef products were purchased from the outlets of two leading Kenyan manufacturing firms. Pure beef and pork sausages and pork sausages containing 1, 5 and 10% beef were prepared in the laboratory. Antigens from these products were extracted with phosphate buffered saline. The presence of beef and pork in these products was determined using absorbed goat antisera to cattle and pig thermostable muscle antigens in an enzyme immunoassay. The assay was able to detect beef in pork sausages at level of 10 and 5% but not at 1%. Of the 44 commercial beef products labelled as containing only beef, 23 (52.3%) were shown to contain pork and 23 (50%) of the 46 pork products were shown to contain beef. Antisera to thermostable muscle antigens proved to be of great value in sp. identification not only of fresh unheated meats but also of heated (cooked, pasteurized and autoclaved) meat products in an enzyme immunoassay. AS

- 413 Renou (JP), Briguet (A), Gatellier (P) and Kopp (J). Determination of fat and water ratios in meat products by high resolution NMR at 19.6 MHz. *Boletim de Pesquisa, EMBRAPA Centro de Tecnologia Agricola e Alimentar* 22(2); 1987; 169-172

The feasibility of using high resolution NMR spectroscopy at low field (19.6 MHz) to discriminate water and fat by means of the small chemical shift difference between them is presented. This method has the advantages of rapidity, sensitivity, field strength and facility. BV

Sausages

- 414 Brown (S) and Ledward (DA). Effect of temperature of comminution on the stability and eating quality of English sausages. *Meat Science* 20(2); 1987; 97-105

The effect of comminution temp. on quality of an English type sausage was studied and feasibility of manufacturing such products without reliable refrigeration facilities was investigated. MVG

- 415 Marin (V), Magnan (L) and Zulian (P). Use of bacterial culture in sausages maturation. *Industria Alimentari* 26(2); 1987; 139-141

Chemical composition and microbiological parameters of two Italian salami has been evaluated. BV

- 416 Schindler (R), Scholz (M) and Feldheim (W). Determination of vitamin A in liver sausage and liver tissue from slaughtered animals using HPLC. *Zeitschrift für Lebensmittel-Untersuchung und -Forschung* 185(3); 1987; 208-212 (De).

Poultry

Chickens

Broilers

- 417 Lane (RH) and Jones (SW). Influence of fry colour on quality of coated broiler thighs. *Journal of Food Quality* 10(4); 1987; 239-244

This study was undertaken to assess the quality of breaded broiler thighs fried at different temp. by sensory evaluation. The results revealed that though 163 °C was generally considered to be optimum frying temp. frying at 177 °C produces a more acceptable breading colour than 163 °C and also reduces frying time. It was found that by reflectance colorimetry it is possible to measure acceptability of fry colour objectively having established subjective colour standards. NGKR

Poultry products

Eggs

- 418 Tsuji (S). Investigation on the physical properties of whipped egg white foams by the multi-biting test. *Journal of Japanese Society of Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 34(3); 1987; 137-142 (Ja).

Physical properties of whipped egg white foams were studied by using the multi-biting test. Comparison of the parameters of mechanical work loads of the plunger (positive and negative) in the multi-biting test of egg white foams was useful to elucidate the effects of whipping time, added sugar content and pH of egg white on the physical properties of whipped egg white foams. The stability of egg white foams was also estimated by comparing the parameters of multi-biting test of egg white foams measured just after whipping with those measured after standing for an hour. Figures of the parameters of mechanical work loads of the plunger in the multi-biting test of egg white foams decreased with standing time. Stability of whipped whole egg (egg white and yolk) foams was lower than that of the egg white foams. Textural changes of egg white in the process of whipping and the physical properties of egg white foams could be also investigated by analysing the profile curves of multi-biting test. Textural changes of egg white foams induced by heating could be effectively compared by the "multi-point mensuration" multi-biting test. AS

SEAFOODS

Fish

- 419 Adams (MR), Cooke (RD) and Twiddy (DR). Fermentation parameters involved in the production of lactic acid preserved fish-glucose substrates. *International Journal of Food Science and Technology* 22(2); 1987; 105-114

Present paper describes studies with a minced fish-salt glucose

model system; factors affecting rapid lactic fermentation including a rapid decrease in pH (<4.5) within the first 48 h; a rapid proliferation of lactic acid bacteria with concomitant decrease in spoilage microorganism count. BV

- 420 Twiddy (DR), Cross (SJ) and Cooke (RD). Parameters involved in the production of lactic acid preserved fish-starchy substrate combinations. *International Journal of Food Science and Technology* 22(2); 1987; 115-121

Studies indicate the methods of fish fermentation to produce a stable, low salt, safe product using alternative carbohydrate source (rice or cassava). Rice or cassava as carbohydrate alternatives were evaluated with or without a 1-day prefermentation. Different carbohydrate to fish proportions were studied in the range 20-100% w/w of fishmince. Prefermented cassava (20% w/w) use resulted in consistent, rapid fermentations; the pH decreasing to <4.5 and the lactic acid bacteria to spoiler ratio exceeding four log cycles of growth within 48 h. Low mol wt. sugar (2% w/w glucose) with cassava prevents undesirable pH increase after the first 2 days of fermentation. Inoculation studies with food pathogens *Staphylococcus aureus*, *Salmonella typhimurium*, *Clostridium sporogenes* and *Escherichia coli* indicated that these pathogens rapidly disappear during the fermentation. BV

- 421 Vareltzis (K) and Buck (EM). Suitability of the Warner-Bratzler shear for textural measurements of fish protein gels. *Journal of Food Quality* 10(2); 1987; 135-142

Protein gels were prepared without added NaCl, from the minced, washed, dewatered flesh of red hake and flounder. Similar gels were prepared from red hake with added NaCl. Gel strength was measured by means of the Warner-Bratzler shear, Fold Test, and Instron UTM. Flounder gels had the highest moduli of deformability values while red had the lowest. Instron percent recovery values were inversely related to these results. The red hake (with NaCl) gel was the most elastic (greatest percent recovery) and the flounder gel was the least elastic. The highest Warner-Bratzler shear force values were recorded for flounder gels while the lowest were recorded for red hake (with NaCl) gels. Fold Test scores were 4.6 - 4.7 for both red hake gels and low (2.7) for flounder gels. The Warner-Bratzler shear was very highly correlated with percent recovery. It was not significantly correlated with Fold Test scores. Fold Test scores correlated very highly with both Instron values. AS

Carp

- 422 Iso (N), Mizuno (H), Saito (T), Mochizuki (Y), Ishii (K), Okunuki (H) and Miyata (K). The relationships between the rheological properties and the freshness of fish meat. *Bulletin of the Japanese Society of Scientific Fisheries* ('Nihon Suisan Gakkai-shi') 53(7); 1987; 1231-1235

The relationships between the freshness of carp meat and its rheological parameters were examined. The K value was used as the freshness index of sample fish. The rheological parameters obtained by the stress-relaxation experiments, which was a kind of non-destructive experiment, did not depend on the freshness of sample except for the high values obtained when the fish samples were at rigor mortis. The stress-relaxation experiments were unable to detect the change of structure with the decrease in freshness. The rupture strength, which could be obtained by destructive experiment,

depended on the freshness of sample. The thermal properties of meat were also examined in connection with the freshness. The changes of enthalpy, ΔH , decreased slightly with decreasing freshness. AS

Cod

- 423 Leblanc (EL), Leblanc (RJ) and Dill (TA). Effects of pressure processing on frozen stored muscle proteins of Atlantic cod (*Gadus morhua*) fillets. *Journal of Food Processing and Preservation* 11(3); 1987; 209-235

Seer fish

- 424 Fazal (AA) and Srikan (LN). Changes in flesh lipids of seer fish during frozen storage. *Journal of Food Science and Technology, India* 24(6); 1987; 303-305

Changes in total lipid (TL), phospholipid (PL), neutral lipid (NL), peroxide value (PV) and free fatty acid (FFA) were studied in seer fish, *Scombroromorus guttatus* during frozen storage (180 days) at -20°C. Initially, seer fish had a TL content of about 4%, PL 16% of TL and NL 84% of TL. On storage, for 180 days PL decreased and NL fraction increased. PV and FFA increased but were within acceptable limits during the period of frozen storage. Gas chromatographic analysis revealed that the total saturated fatty acids (SFA) of NL were higher (54.47%) than the unsaturated fatty acids (45.51%), while the polyunsaturated fatty acids, (PUFA) were more (25.85%) than the mono-unsaturated fatty acids (MUFA) (17.66%). During frozen storage, there was a drastic decrease in PUFA while an increase in SFA and MUFA was noticed. PL showed highest amount of SFA (67.25%) followed by MUFA (20.65%) and PUFA (11.95%). During frozen storage, SFA and MUFA decreased but there was an increase of PUFA. AS

Trouts

- 425 Oberbach (H) and Hartfiel (W). Effects of different Alpha-tocopherol and selenium additions in ratios with high contents of polyen acids on rainbow-trouts (*Salmo gairdnerii*, R.). *FAT Science and Technology* 89(5); 1987; 195-199 (De).

Fish products

- 426 Da Ponte (DJB), Roozen (JF) and Pilnik (W). Effects of iota carrageenan, carboxymethyl cellulose and xanthan gum on the stability of formulated minced fish products. *International Journal of Food Science and Technology* 22(2); 1987; 123-133

The effect of iota carrageenan, carboxymethyl cellulose and xanthan on sensory properties, wt. loss, physical properties and formation of dimethylamine (DMA) and formaldehyde (FA) in formulated minced fish products (fish chips and fish sticks) is studied. All the additives had a significant effect on texture and wt. loss during frozen storage. Precooking of fish sticks to an interval temp. of 80°C arrested the production of DMA and FA but increased the wt. loss and mass. Force, sensory analysis showed good correlation between sensory attributes and the instrumental measurements of texture and wt. loss. Fish chips with carboxymethyl cellulose and xanthan were preferred to the control after 8 months of frozen storage, while the fish sticks with iota carrageenan were not preferred significantly after 14 wk of storage. Iota carrageenan, and to some extent carboxymethyl cellulose, decreased fat uptake during frying. BV

Krill

- 427 Chang (HM), Hayakawa (I), Shinohara (K), Omura (H), Hoshi (M), Sasamoto (Y) and Nonaka (M). Studies on the spinnability of Antarctic krill muscle proteins treated with alkali. Journal of Japanese Society of Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi') 34(3); 1987; 190-196 (Ja).

A process for preparing spun protein fibers from Antarctic krill (*Euphausia superba*) muscle was described. Na-alginate, NaOH solution and deionized water were mixed to make spinning dopes which were extruded into a calcium coagulation solution to produce the fibers. The relationships between the composition of dopes and their spinnability were studied. Spinnability of dopes were classified into five grades and dopes with good spinnability were those which could be taken up at a velocity of 35 m/min when extruded into a calcium coagulation solution (pH 5 or 7.6). The nature, pH and temp. of the coagulation solution also affected the spinnability of the dopes. The optimum conditions for obtaining the most adequate fibers were 3.8% (W/V) of calcium chloride and 15-25 °C of temp. of the coagulation solution. At 45 °C of temp. of the coagulation solution, there was a decrease in the fiber strength. Protein recovery fiber from the Antarctic krill muscle was about 70%. Fibers with adequate strength could also be obtained by extrusion of the dopes into sea water containing 3.8% (W/V) of calcium chloride. AS

- 428 Chang (HM), Hayakawa (I), Shinohara (K), Omura (H), Hoshi (M), Sasamoto (Y) and Nonaka (M). The spinnability of Antarctic krill muscle proteins and the behavior of spinning dope. Journal of Japanese Society of Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi') 34(3); 1987; 197-202 (Ja).

Denaturation and hydrolysis of proteins occur easily during the preparation of dope from Antarctic krill (*Euphausia superba*) muscle proteins thus it is hard to obtain the homogenous spun fiber products. Heat generated during the mixing process of spinning dope enhances the denaturation and hydrolysis. In order to find out the most adequate approach to prepare spinning dope, the relationships between the spinnability and the major subunit contents of Antarctic krill muscle proteins in various spinning dopes were studied with SDS-polyacrylamide gel electrophoresis and gel filtration. Dope which showed good spinnability was prepared optimum at 48 °C during the mixing process and the most adequate concn. of NaOH was found to be 0.4% (W/W). The elution pattern of raw Antarctic krill muscle proteins showed 3 peaks, but it was apparently altered by Na-alginate or K-carrageenan. Results showed that there was a complex formation between Antarctic krill muscle proteins and anionic polysaccharides as they were homogenized during the mixing process. AS

Molluscus

Squids

- 429 Sadowska (M) and Sikorski (ZE). Collagen in the tissues of squid *Illex argentinus* and *Loligo patagonica* - contents and solubility. Journal of Food Biochemistry 11(2); 1987; 109-120

Collagen was isolated from the skin, connective tissue sheets, and mantle muscles of squid *Illex argentinus* and *Loligo patagonica*, by extracting all soluble noncollagenous material. The tissues and the collagen isolated were characterized by determining the total nitrogen, hydroxyproline, and solubility. The contents of hydroxyproline

in the collagen isolate of skin, membranes, and muscle of *Illex* were 5.3, 8.0, and 4.4% dry matter and *Loligo* 6.1, 7.4 and 4.9%, resp. The collagen contents in these tissues were in *Illex* 4.9, 7.8, and 1.0, in *Loligo* 3.4, 4.9, and 0.3%, resp., in the wet material. Collagen preparations obtained from the skin, membranes, and mantle muscle of *Loligo* yielded, resp., 9%, 4%, and 8% collagen soluble in citrate buffer. For *Illex* squid the solubilities were 41%, 6%, and 21% resp. AS

Oysters

- 430 DePaola (A), Kaysner (CA) and McPhearson (RM). Elevated temperature method for recovery of *Vibrio cholerae* from oysters (*Crassostrea gigas*). *Applied and Environmental Microbiology* 53(5); 1987; 1181-1182

Of 222 *Vibrio cholerae* isolates from diverse clinical and environmental sources, 219 produced visible growth in alkaline peptone broth when incubated overnight at 42 C. In field trials conducted to compare enrichment at incubation temp. of 42 and 35 C, significantly higher rates of isolation ($P < 0.05$) and recovery ($P < 0.01$) of *V. cholerae* from oysters were observed at 42 C. AS

Prawns

- 431 Madden (RH) and Kingnan (S). Changes in the microbial quality of *Nephrops norvegicus* during processing for retail packs. *Journal of Food Protection* 50(6); 1987; 460-463

Whole tails of prawns, *N. norvegicus*, caught in the Irish sea, were examined for microbial quality after freezing and the effects of subsequent processing into frozen prawns and breaded scampi, in retail packs, were monitored. Results showed that the mean total viable counts (TVC) of whole tails was 1.3×10^6 g while that of processed tails was 9.7×10^5 g TVC was significantly reduced by peeling and polyphosphate treatment which it was increased by gutting/sorting and reforming. Overall processing caused an insignificant change in TVC when compared with the initial load. The rates of coliforms, total count of bacteria steadily increased during processing and might serve as an indicator of source of contamination with few quality final product. Low grade raw materials would have a low ratio and poor hygiene in processing but good quality raw materials would result in a high ratio. Both TVC and coliform count were required to determine the microbial quality. MVB

PROTEIN FOODS

- 432 Uwaegbute (AC) and Nnanyelugo (DO). Nutritive value and biological evaluation of processed cowpea diets compared with local weaning foods in Nigeria. *Nutrition Reports International* 36(1); 1987; 19-29

The nutritive and biological values of three diets based on cowpea-cereal or cowpea-yam tuber mixtures were determined. Two other foods (cerelac and corn pap) used for weaning in Nigeria were similarly assessed. All diets were compared with casein as control. The diets were formulated to contain 10% protein. Protein from the cowpea/cereal was in the ratio of 70:30 while that from cowpea/root crop was 80:20. Six rats with initial wt. of 45-55 g were raised on each of the diets for 35 days. The rats were weighed twice a wk and food intake recorded daily. Urine and faecal output over the 7 days before sacrifice were collected. Protein efficiency ratio (PER), bio-

logical value (BV), net protein utilisation (NPU) and nitrogen balance were determined. The results showed no significant difference in the food intakes of the rats fed the three experimental diets and cerelac, but food consumption of casein fed group was significantly higher than for all the other diets. Nitrogen consumption of rats fed casein was similar to those of animals fed cerelac, and DCP:CO but significantly higher than for other groups. However, faecal and urinary nitrogen excretion of rats fed cerelac were significantly higher than other diets investigated. The digestibility of cowpea-rice mixture was similar to that of casein. PER, NPU, BV and organ weighed for all six diets were similar. However, as expected, pap had inferior value for all parameters examined. KAR

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Alcoholic beverages

Beer

- 433 Curtis (NS). Brewing-past, present and future, the impact of three decades of science on brewing. *Journal of the Institute of Brewing* 93(3); 1987; 177-180

The contribution of the practices of brewing to science is critically reviewed. MVG

- 434 Verzele (M) and Van de Velde (N). Bicyclic isomerisation products of humulone and cohumulone in beer. *Journal of the Institute of Brewing* 93(3); 1987; 190-192

Separation of five and six membered ring hop acids can be obtained selectively by high performance liquid chromatography (HPLC) on anthracene-bonded silica gel. Photo-diode array detection combined with high resolution HPLC of the six-membered compounds of beer reveals the presence of I and II. These compounds are formed by reaction of the respective Alpha acids, humulone (III) and cohumulone (IV), in brewing conditions. Their concn. in beer is a few $\mu\text{g/l}$. AS

- 435 Wheatley (AM) and Tipton (KF). Determination of tyramine in alcoholic and non-alcoholic beers by high performance liquid chromatography with electrochemical detection. *Journal of Food Biochemistry* 11(2); 1987; 133-142

A rapid procedure for the partial purification of tyramine from beer and its analysis by HPLC with electrochemical detection has been reported in this paper and this methodology was then applied to the measurement of tyramine in alcoholic and non-alcoholic beers. Ultra-filtration of the beer followed by a cation-exchange step provided clear resolution of the tyramine peak and shortened the assay time very much. The results showed that the concn. of tyramine in the alcoholic beers ranged from 0.98 to 3.21 mg L^{-1} whereas it ranged in the non-alcoholic beers from 0.52 to 3.96 mg L^{-1} . It has been reported to be hazardous to patients on monoamine oxidase inhibition treatment to consume both type of beers and the possibility of application of this method to other beverages is also discussed. NGKR

Malt

- 436 Lloyd (WJW). The determination of sulphur dioxide in malt. *Journal of the Institute of Brewing* 93(3); 1987; 187-189

The Institute of Brewing Recommended method for the detn. of sulphur dioxide in beer has been modified for detn. in malt. Three inter-laboratory trials are reported and the resulting procedure is described. It has the advantages of being well traide in its general form and employing relatively cheap equipment. While the inter laboratory reproducibility achieved was not particularly good the method is published for use in laboratories where it may fulfil a present need. AS

Cider

- 437 Berres (H-L) and Beck (H). Sterile filtration during the filling of cider. *Flussiges Obst* 54(9); 1987; 499-500

This paper describes a sterile filtration system for filling of beverages particularly cider. The end filtration through membrane filter candles offer the user the best possible safety. The advantages of this filtration system are a closed filtercase, long periods of use of the filter candles, no dripping, easy handling and low investment and consumption costs. BV

Wines

- 438 Aguilar (MV), Martinez (MC) and Masoud (TA). Arsenic content in some Spanish wines. Influence of the wine-making technique on arsenic content in musts and wines. *Zeitschrift fur Lebensmittel-Untersuchung und -Forschung* 185(3); 1987; 185-187

The effect of the traditional wine-making system on the total As content of red and rose wines is investigated. All the essential technological means of treating grapes must and wine were examined systematically. BV

- 439 Watanabe (M), Iino (S) and Nojiro (K). On the sulphite binding capacity of three sulphur dioxide acceptors in different wines. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi') 34(3); 1987; 171-177 (Ja).

Total level of bound sulphur dioxide (EL) estimated theoretically from the amounts of three sulphur dioxide acceptors, acetaldehyde, pyruvate and α -ketoglutarate, was compared with the actual level of bound sulphur dioxide (AL) determined experimentally in the different wines. It was found that years of vintage, grape var., young and stored of wines were not correlated with sulphite binding capacity. The sulphite binding efficiency of three sulphur dioxide acceptors in whites was notably higher than that in red wines. The ratio of EL to AL of the white wines was greatly higher than that of the red wines. And also, EL was always lower than AL and able to account for 51.0 to 85.3% of the AL in terms of three sulphur dioxide acceptors. AS

- 440 Watanabe (M), Iino (S) and Nojiro (K). Effect of grape skins on the sulphite binding efficiency of three sulphur dioxide acceptors in the wines. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi') 34(3); 1987; 148-154 (Ja).

The effect of fermentation on skins a unusual for red wine-making on the sulphite binding efficiency of three sulphur dioxide i.e. acetaldehyde, pyruvate and Alpha -ketoglutarate, were examined with special reference to the effects of free-sulphur dioxide content, pH value and temp. of the wines. The following results were obtained. (1) Sulphite binding efficiency of three sulphur dioxide acceptors was decreased obviously in the wines fermented on skins. (2) The sulfite-binding efficiency increased remarkably in wines containing higher level of free-sulphur dioxide and of lower temp. while it was not significantly affected by a change in pH range. (3) The level of bound-sulphur dioxide in the wines obtained by fermentation on skins (EL) estimated on the basis of the amounts of three sulphur dioxide acceptors found in wines, were always lower than the actual level of bound-sulphur dioxide (AL) determined. Consequently, the EL was able to account for 73 to 87% of AL in terms of three sulphur dioxide acceptors. (4) The EL of the wines obtained by fermentation of skins was very higher than the AL in the previous papers, the difference between the EL and the AL probably results from the over-estimation of the sulphite binding efficiency of three sulphur dioxide acceptors. AS

Musts

- 441 Binnig (R). RTK=Rectified grape must concentrate production, application and legal aspects. *Flussiges Obst* 54(9); 1987; 496-498

Non-alcoholic beverages

Cocoa

- 442 Schnee (R) and Eichner (K). Analytical determination of the roasting extent of cocoa. *Zeitschrift für Lebensmittel-Untersuchung und -Forschung* 185(3); 1987; 188-194 (De).

2, 3-dihydro-3, 5-dihydroxy-6-methyl-4H-pyran-4-one (2), 3-dihydroxy-3 hydroxymaltol was detected in roasted cocoa by HPLC. The results show that within the range of technical roasting processes, the concn of this compound showed a linear correlation with respect to the extent of roasting and therefore it can be used as an indicator substance for the detn. of the extent of cocoa bean roasting. BV

Coffee

- 443 Clifford (M). What factors determine the intensity of coffee's sensory attributes?. *Tea and Coffee Trade Journal* 159(8); 1987; 35-36, 38-39
- 444 Kruijf (Nde), Schouten (A) and Van Der Stegen (GHD). Occurrence of benzo(a)pyrene in roasted coffee, instant coffee and coffee brew. *Cafe-Cacao-The* 31(2); 1987; 151-154 (Fr).

Given are the recent data on the occurrence of benzo(a)pyrene in various commercial roasted coffee and instant coffee samples available in several European countries, and on benzo(a)pyrene levels in coffee brew. The samples were analysed by HPLC with a reversed-phase column and fluorescence detection under isocratic conditions. The benzo(a)pyrene levels in fifty roasted coffee samples in the period 1983-1984 ranged from $< 0.2 \mu\text{g/kg}$ to $1.2 \mu\text{g/kg}$. No benzo(a)pyrene was detected in four instant coffee samples. Coffee brews prepared from two roasted coffee samples had benzo(a)pyrene contents of $< 1 \text{ ng/l}$. BV

- 445 Lee (S). Synthetic coffee may welcome on the market in the near future. *Tea and Coffee Trade Journal* 159(8); 1987; 5-6

Caffeine

- 446 Collins (TFX), Welsh (JJ), Black (TN), Whitby (KE) and O'Donnell (MWJr). Potential reversibility of skeletal effects in rats exposed in utero to caffeine. *Food and Chemical Toxicology* 25(9); 1987; 647-662

The effects of prenatal caffeine on the development of offspring, and evaluation of the effects of caffeine on the prenatal and post-natal development of bones in rats is studied. Whether the delay in ossification in the offspring of caffeine treated rats is reversible up to 6 days post-natally is considered. BV

Fruit juices

- 447 Kammann (B). Usage of flowmeters in the fruit juice industry. *Flussiges Obst* 52(9); 1985; 481-484
- 448 Otto (K), Dortges (S) and Jost (V). Flotation-A new way of fruit juice clarification. *Flussiges Obst* 52(9); 1985; 479-484
- 449 Tonogai (Y), Ando (T), Tsumura (A) and Ito (Y). Determination of rosin ester gum emulsifiers in fruit juices by gas chromatography. *Journal of Food Protection* 50(6); 1987; 464-467

Apple juices

- 450 Chua (HT), Rao (MA), Acree (TE) and Cunningham (DG). Reverse osmosis concentration of apple juice: Flux and flavour retention by cellulose acetate and polyamide membranes. *Journal of Food Process Engineering* 9(3); 1987; 231-245

In this study apple juice was conc. in a pilot scale reverse osmosis unit using two commercial spiral wound cellulose acetate membranes with 97% (CA-97) and 99% (CA-99) NaCl rejection ratings and an experimental polyamide (PA-99) membrane with 99 % salt rejection rating. Results showed that flux and concn. rates were found to be higher for the PA-99 membrane than for the CA membranes. CLC analysis of feed, permeate and concn. samples undertaken revealed that the PA-99 membrane retained 45% of the total odour active volatiles while the CA-99 retained 23%. Acetates were not found to increase when apple juice was concentrated with the cellulose acetate membrane. The retention of the individual aroma compounds for the CA-99 and PA-99 membrane was rationalised using polar, non-polar and steric parameters. NGKR

- 451 Feri (M). Experience with ultrafiltration of apple juice. *Flussiges Obst* 54(9); 1987; 492-496
- 452 Velikonja (J), Pupovac-Velikonja (A) and Durrigl (A). The cultivation of *Aspergillus parasiticus* on apple juice. II. Influence of butylated hydroxyanisole and butylated hydroxytoluene on fungal growth and aflatoxin biosynthesis. *Zeitschrift für Lebensmittel-Untersuchung und -Forschung* 185(3); 1987; 223-226 (De).

Aspergillus parasiticus (NRRL 2999) was incubated in apple juice (from syrup), quiescently at 25 °C for up to 15 days in the presence of butylated hydroxyanisole (BHA) or butylated hydroxytoluene (BHT) at concn. of 100, 200, 300, or 400 mg/l. Mycelial dry wt., pH and concn. of aflatoxin B1 and G1 were measured every 3 days with the initial pH of 2.5 remaining unchanged in all samples. BHA suppressed fungal growth and toxin accumulation during the observed incubation period. however, a concn. dependent growth delay and earlier peaks of toxin

accumulation suggested environmental adaptation of the mould. BHT (from 200 mg/l onwards), led to growth inhibition by about 25% (solubility limit of BHT lies between 200 and 300 mg/l) and at concn. of 200 mg/l, it led to a reduction of toxin accumulation by approx. 45%. At 100 mg/l, however, BHT stimulated aflatoxin production (1.90 times more G1 and 6.65 times more B1 than in the controls). At all tested concn. of BHA or BHT, as well as in the controls, the accumulation of aflatoxin G1, without exception, surpassed that of B1. AS

Lemonades

- 453 Pfannhauser (W), Rauscher (H) and Thaller (A). Investigations on the change of orange lemonades during storage. *Deutsche Lebensmittel-Rundschau* 83(10); 1987; 307-314

The changes of aroma components in orange oils, as used for the preparation of lemonades, was investigated during storage under different conditions. Gas chromatography, sniffing analysis and the triangle-test for sensory evaluation of differences have been applied. Alpha terpineol, (-) carvon and trans-carveol have been identified as aroma substances, which give negative sensory results in orange lemonades. Cluster analysis results show that it is possible to predict negative changes of lemonade flavour at an early stage before instrumental or sensory data could show. BV

Orange juices

- 454 Chen (JH) and Zall (RR). Refrigerated packaged orange juice can be monitored for freshness using polymer indicator label. *Dairy and Food Sanitation* 7(6); 1987; 280-282

This article focus on the changes in quality or shelf life of packaged orange juice stored at refrigerated and non-refrigerated temp. as measured by sensory, biological and chemical parameters and the feasibility of using lifelines inventory system for measuring freshness and shelf life characteristics of orange juice when the commodity is challenged by different time/temp. conditions. BV

- 455 Maccarone (E), Maccarrone (A) and Rapisarda (P). Colour stabilization of orange fruit juice by tannic acid. *International Journal of Food Science and Technology* 22(2); 1987; 159-162

Stabilization of anthocyanins by tannic acid is due to the formation of mole complexes more resistant than isolated pigments to the chemical, photochemical and enzymatic degradations. Results on mono orange juice indicated that the addition of tannic acid provides commercial stability of the red colour to the juice. BV

- 456 Shaw (PE), Wilson (CW) and Hansen (RW). HPLC. determination of trace levels of succinic acid in orange juice from freeze-damaged and undamaged fruit. *Journal of the Science of Food and Agriculture* 41(2); 1987; 153-158

This study reports amounts of succinic acid present in orange juice obtained from freeze damaged naturally on the tree and by storage at below freezing temp. and compares these values with succinic acid levels in undamaged orange fruit by HPLC which has been modified. The results showed that there is no change in succinic acid both in the fruit frozen on the tree and during storage. NGKR

Pear juices

- 457 Brveridge (T) and Harrison (JE). Storage browning of pear juice concentrate. Canadian Institute of Food Science and Technology Journal 20(3); 1987; 170-172

Brown colour development (absorbance at 420 nm) in 45.2, 55.4, 65.1 and 72.5 Brix. Pear juice conc. stored up to 210 days at 37, 20, 13 and 2 °C could be described by assuming 0-order kinetics. Rate constants of 37.3, 71.8, 84.4 and $125 \times 10^{-3} A_{420} / \text{day}^{-1}$ were obtained at 37 °C and the average Arrhenius activation energy was 21.6 Kcal. mole⁻¹ (90.4 KJ mole). No brown colour developed in any concn. stored at -13 °C for 210 days. The rate constants calculated for 37, 20, 13 and 2 °C were approximated by extrapolation of earlier browning data collected at temp. between 50 to 80 °C. AS

Tea

- 458 Fischer (N), Nitz (S) and Drawert (F). Bound flavour compounds in plants. Part II. Free and bound flavour compounds in green and black tea. Zeitschrift für Lebensmittel-Untersuchung und -Forschung 185(3); 1987; 195-201 (De).

3-hexenol-1-ol, benzylalcohol and 2-phenylethanol are the bound flavour compounds in green and black tea var. Linalool and geraniol are present in black tea and green tea resp. The composition of the flavour compounds liberated from bound forms had a similar complexity to that of the three flavour compounds, the difference being based upon the different production procedures. BV

FATS AND OILS

Fats

- 459 Arens (M) and Kroll (E). German Standard Methods for investigation of fats, fatty products and related materials, 76th report: Analysis of fat raw materials X. FAT Science and Technology 89(5); 1987; 193-195 (De).

Oils

- 460 Muller (HA) and Hampf (W). A new method to determine the tin content of fats and oils, and its application to examine migration of organotin stabilizers out of polyvinyl chloride. Deutsche Lebensmittel-Rundschau 83(11); 1987; 341-344

Essential oils

- 461 Lawrence (BM). Progress in essential oils. Perfumer & Flavorist 12(6); 1987; 59-62, 64, 65, 68-70

Covers juniper berry oil, lavandin oil and lavender oil. BV

Pentaclethra macrophylla oils

- 462 Jones (AC), Robinson (JM) and Southwell (KH). Investigation into Pentaclethra macrophylla seed oil: Identification of hexacosanoic (C 26:0) and octacosanoic (C 28:0) fatty acids. Journal of the Science of Food and Agriculture 40(2); 1987; 189-194

The oil seed of *Pentaclethra macrophylla* known as African oil bean used as food source in West Africa has been examined for the fatty acid composition of the seed oil by GLC and MS. Results showed that linoleic acid was the major fatty acid (56.6%) with oleic acid (16.1%), and lignoceric acid (10.5%). Two other long chain fatty acid were shown to be hexacosanoic acid (C 26:0) and octacosanoic acid (C 28:0) 4.8% and 1% being present respectively with an oil content in the seed of 42%. NGKR

Rapeseed oils

- 463 Harnqvist (L), Leissner (O) and Petersson (B). The polymorphism of low erucic rapessed oil with high content of palmitic acid. *FAT Science and Technology* 89(5); 1987; 190-193

A new type of low erucic acid rapeseed oil containing high amount (11%) of palmitic acid (C₁₆ -LOBRA) was studied, both in lab-scale and in pilot plant equipment. The polymorphic behaviour of fat blends and margarine emulsions consisting of C₁₆ -LOBRA/, LOBRA and soybean oil and their hydrogenated fat were examined. The results clearly show the potential in the hydrogenated C₁₆ -LOBRA. The time before the stable Beta form is developed is much longer for the hydrogenated - C₁₆ -LOBRA compared with the hydrogenated LOBRA and in fact similar to a hydrogenated soybean oil. The hydrogenated C₁₆ -LOBRA is therefore well suited to be used in e.g. margarine systems. AS

Soybeans oils

- 464 Unklesbay (NF), Lee (H-H), Ellersieck (MR) and Huff (H). Increases in the dielectric constants of soybean and sunflower oils and product quality changes of potatoes during interrupted deep fat frying. *Journal of Food Quality* 10(2); 1987; 123-134

In this investigation the rate of change in the dielectric constants of soybean and sunflower oils during a 32 h interrupted period of heat processing French fries was determined by measuring the parameters moisture, yield, texture and food energy. The results showed that the dielectric constant of sunflower oil increased at a significant rate than soybean oil indicating higher oil deterioration although the moisture content and yield of the French fries did not differ throughout the 32 h period. The mean texture values (force) were 661 and 643 g for soybean and sunflower oil resp. Significant linear interactions among oil and time were found for texture. The food energy content (Kcal/g; dry basis) of French fries heat processed in sunflower was found to be significantly lower than the fries processed in soybean oil. NGKR

SPICES AND CONDIMENTS

Spices

- 465 Heide (L) and Bogl (W). Identification of irradiated spices with thermo- and chemiluminescence measurements. *International Journal of Food Science and Technology* 22(2); 1987; 93-103

Thermoluminescence and chemiluminescence intensities of twenty nine different spices were measured to determine whether the techniques could be used to detect if spices had been irradiated (10KGY) and stored after irradiation. In each case it was possible to identify

radiation treatment with 10 KGY by at least one of the two methods, if irradiation occurred 2-3 wk prior to the examination. The luminescence effect from radiation treatment differs from spice to spice. Intensity increase in samples treated 10 KGY vary between 1 (no effect) and about 1000 times compared with untreated samples. Thermoluminescence proved to be more useful than chemiluminescence, as with most spices radiation treatment could be identified after longer period of time. A combined or simultaneous use of both techniques assures a rapid identification of radiation treatment in most of the examined spices. With the exception of garlic, onions, white and black pepper, the irradiated spices can be identified more than 6 months after irradiation. Some curcuma, juniper berries, basil, chillis, parika and celery, show increased luminescence intensities for a year or longer after irradiation. AS

- 466 Padwal-Desai (SR), Arun Sharma) and Amonkar (SV). Disinfestation of whole and ground spices by gamma irradiation. *Journal of Food Science and Technology, India* 24(6); 1987; 321-322

Number of insect sp. were identified in chilli *Capsicum annum* Linn. turmeric (*Curcuma longa* Linn.), ginger (*Zingiber officinale* Roscoe.), pepper (*Piper nigrum* Linn.) and coriander (*Coriandrum sativum*) and also in two commercial brands of prepacked ground spices. *Lasioderma serricornis* (Cigarette beetle) *Oryzaephilus surinamensis* (Saw toothed grain beetle), *Rhizopertha dominica* (Lesser grain borer), *Sitotroga cerealella* (Angoumois grain moth) and *Tribolium castaneum* (Red flour beetle) were the predominant pest sp. found in these spices. Exposure of spices to Co^{60} gamma irradiation at 1 KGY dose did not show adult emergence of insects in these spices during storage at ambient temp. (28-30 °C) indicating that the radiation dose (10 KGY) that has been shown to be effective for microbial decontamination of spices destroys insect pests as well. AS

- 467 Yang (GC), Mossoba (MM), Merin (U) and Rosenthal (I). An EPR study of free radicals generated by gamma-radiation of dried spices and spray-dried fruit powders. *Journal of Food Quality* 10(4); 1987; 287-294

This work describes the results of study of the generation and decay of radiation induced free radicals in dry spices and spray dried fruit powders at ambient temp. The gamma radiation of turmeric powder pepper powder, dry mustard powder, cinnamon and paprika powder at 30 Kgy 30 °C produced free radicals detectable by EPR. The results showed that for dried foodstuffs the EPR measurements could serve as an analytical tool whether the materials has been irradiated in addition to the existing alternative methods such as measurements of chemiluminescence and thermoluminescence. NGKR

Ajowan

- 468 Renu Agrawal) and Patwardhan (MV). Thymol-a secondary product from callus cultures of Ajowan (*Carum copticum*) *Journal of Food Science and Technology, India* 24(6); 1987; 322-324

Ajowan (*Carum copticum*) seeds (marked samples) were used for the production of secondary metabolites by tissue culture. A callus cultures were established from these seeds. MVG

Coriandrum

- 469 Misra (N). Mycotoxins in spices. III: Investigation on the natural occurrence of aflatoxins in *Coriandrum sativum* L.. *Journal of Food Science and Technology, India* 24(6); 1987; 324-325

Aflatoxins were isolated from fresh and 12 months stored ten seed samples of *Coriandrum sativum* L. Of these, only four were found to be BGY positive; aflatoxins B₁, B₂, and G₁ were isolated from BGY positive samples. The concn. of various aflatoxins were determined after development with chloroform-acetone from observation on their fluorescence emission on silica gel plates. Aflatoxin content ranged from 10 to 75 µg/Kg in the 12 month stored samples. AS

Pepper

- 470 Thoma (PP), Nirmala Menon (A), Bhat (AV) and Mathew (AG). Selective grinding as a basis for separating white pepper. *Journal of Food Science and Technology, India* 24(6); 1987; 306-308

White pepper was produced by compressive forces using roller mill instead of conventional retting and scrubbing and comparative difference between behaviour of black skin and inner white core during these methods studied. In the new method white pepper fraction (yield of which can be varied by controlling the parameters) was separated by selective sieving. The dry black skin was found suitable for oil and oleoresin extraction. During roller milling and subsequent evaporation, the squeezing action on cells resulted in loss of essential oil especially monoterpene fraction. MVB

SENSORY EVALUATION

Nil

FOOD STORAGE

- 471 Loschiavo (SR) and White (NDG). The loss of a grain fumigant mixture of carbon tetrachloride and carbon disulphide through sealing and various covering materials. *Canadian Entomologist* 119(6); 1987; 595-597

Liquid fumigants were widely used to disinfect stored grain in USA and many parts of the world. Studies carried out in this investigation to determine and compare the rate of penetration of a mixture of carbon tetrachloride and carbon disulphide gas through various materials that may be used to hold gas inside bagged or bulk commodities during fumigation or for sealing small openings such as door or window cracks. The materials tested in this study are often used in commercial fumigations and are relatively inexpensive. A liquid formulation Sanifume (Sanex Co Mississauga Ont.) of carbon tetrachloride, carbon disulphide (82.5:16.5 V/V), has been used for these studies. Results showed that Saran wrapper was the most effective covering permitting only an average daily loss of 1.2% and during the one week period of fumigation with sanifume the total loss was expected to be only 8% and hence this is found to be better than commercially used kraft paper gumtapes and this result will also be applicable to other fumigants. NGKR

INFESTATION CONTROL AND PESTICIDES

Infestation control

Tenebrio molitor

- 472 Slama (K) and Miller (TA). Insecticide poisoning: Disruption of a possible autonomic function in pupae of *Tenebrio molitor*. *Pesticide Biochemistry and Physiology* 29(1); 1987; 25-34

Poisoning of pupae of *Tenebrio molitor* by pyrethroid, carbamate, or organophosphate insecticides was monitored by recording pressure in the hemocoel. The pressure was controlled automatically at a constant negative 0.5 KPa value and predictable sharp peak increases in pressure of 0.5-1.0 KPa occurred in bursts. The pressure pulse in *Tenebrio* pupae were thought to represent the activity of an important autonomic function in insects. Insecticide poisoning increased frequency of the pressure pulse and their amplitudes as high as 6 KPa in dose-dependent manner. The pattern in pyrethroid poisoned pupae was distinctly different from that following carbamate or organophosphorus poisoning. At 12-18 h after treatment, the pattern of pressure bursts in pupae recovering from poisoning began to resemble the pattern before treatment, with peaks of pressure. In pupae not recovering from poisoning, the pattern was distinctly different, with only single peak pulses of pressure. Thus, it was possible to determine the fate of poisoned pupae after 12 h. AS

Pesticides

- 473 Samson (PR) and Keating (JA). Effect of relative humidity on the biological activity of insecticides in impregnated paper assays. *Journal of Stored Products Research* 23(3); 1987; 177-181

Five insecticides-fenitrothion, pirimiphos-methyl, chlorpyrifos-methyl, bioresmethrin, and permethrin-were applied to filter paper in solution in a mixture of petroleum ether, acetone, and risella oil as recommended for resistance testing of stored product Coleoptera by FAO. Potency of the residues was measured by biological assay at different relative humidities. The three organophosphorus compounds were more potent at a higher humidity but the effect was slight, relative potencies being less than 2 between 93 and 30% rh. Potencies of the two pyrethroids were unaffected by humidity. When fenitrothion was applied to filter papers in acetone plus petroleum ether (i.e. without Risella oil), it was about seven times more potent at 90% than at 40% rh (ratio of KD_{50} 's), whereas in acetone alone it was 17 times more potent. When applied in water as either a water-dispersed powder or an emulsion it was about 14 times and at least 150 times more potent at 90% than at 40% rh resp. No consistent difference was found between the toxicity of topically applied fenitrothion at different humidities. It was concluded that relative humidity affects the potency of organophosphorus residues on filter papers by altering their availability for pick-up, and this effect is minimal when insecticides are applied according to the FAO recommended method. AS

- 474 Singh (R). Studies on pesticides based on coumarin. I. Antifungal activity of 6-alkyl-3-n-butyl-7-hydroxy-4-methylcoumarins. *Pesticide Science* 20(2); 1987; 125-130

BIOCHEMISTRY AND NUTRITION

Biochemistry

- 475 De Weck (D), Nielsen (HK) and Finot (P-A). Oxidation rate of free and protein-bound tryptophan by hydrogen peroxide and the bioavailability of the oxidation products. *Journal of the Science of Food and Agriculture* 41(2); 1987; 179-185

This study was undertaken to determine and compare rates of oxidation in vitro of free and protein bound tryptophan under relatively strong oxidation products are utilisable in vivo. The results revealed that it is clear that although free tryptophan can be oxidised under severe conditions protein bound tryptophan is comparatively stable, consequently in normal methods of food manufacture and storage appreciable loss of tryptophan by oxidation is not very likely and the loss that does occur will have little nutritional significance. NGKR

- 476 Milic (BL), Djilas (SM) and Vlaovic (DS). Effect of temperature on the kinetics of free radical formation during the pyrolysis of some amino acids. *Analyst* 112(6); 1987; 779-781

The kinetics of the formation and the structure, nature and stability of free radicals formed by pyrolysis of DL lysine, DL-aspartic acid and DL-glutamic acid were investigated by electron spin resonance (ESR) spectroscopy and the reactivities of the amino acids were determined by differential scanning calorimetry (DSC) and thermogravimetric analysis (TGA). The pattern ESR spectral intensity of the amino acid pyrolysis which lasted during a reaction period between 0.12×10^3 to 1.8×10^4 , dependant on the temp. duration of pyrolysis and structure of the amino acid. It was concluded that the reaction between degraded and transferred amino acid molecules or by-products, as intermediates, led to the formation of different final reaction products and considerably different kinetics of the pyrolysis reaction. MVG

- 477 Sandstrom (B), Davidsson (L), Kivisto (B), Hasselblad (C) and Cederblad (A). The effect of vegetables and beet fibre on the absorption of zinc in humans from composite meals. *British Journal of Nutrition* 58(1); 1987; 49-57

The absorption of zinc in humans from composite meals was determined by extrinsic labelling of the meals with ^{65}Zn and measurement of the whole body retention of the radioisotope. Results showed that, besides the low Zn content in vegetables, a large intake of vegetables or pure vegetables free preparation had no effect on Zn availability from animal protein based meals. MVG

Nutrition

- 478 Busi (BR), Sai Leela (M), Rector Babu (ADW) and Jyothi (GM). Food, dietary intake and feeding practices in urban slums of Visakhapatnam. *Indian Journal of Nutrition and Dietetics* 24(6); 1987; 163-169

The food and dietary intakes of the slum dwellers comprising of families engaged in petty business, unskilled worker, skilled workers and fishing was selected for the study. Five slums were included from which 113 families were randomly selected for assessment of dietary intakes. Consumption of cereals, pulses, vegetables, fish, meat, egg, milk, sugar and oil were recorded. The study showed that the nutrient

intake of fishing group was high than other groups. The nutrient intake was also related to the income of the groups. It is concluded that the diets of all families were deficient in calories, minerals, and vitamins while only few were deficient in proteins. With regular employment there was an even pattern of consumption of all kinds of foods. NGKR

- 479 Devadas (RP) and Saroja (S). Dietary supplementation and vitamin A nutrition of rural children Indian Journal of Nutrition and Dietetics 24(1); 1987; 1-7

It has been found by studies on the daily food intake of children of the age range 1-12 yr that it was deficient in all the nutrients including vitamin A leading to suffering from some degree or other of xerophthalmia. In view of this deficiency studies and the supplementation of the diets of the preschool children in selected villages of Coimbatore district were carried out to suggest suitable programmes for prevention of this disease. An attempt was also done to determine the bioavailability of Beta-carotene from amaranth, papaya fruit and carrots on selected groups of preschool children by studying changes in their serum vitamin A levels. A daily supplement in diet of 140 g papaya fruit, 40 g amaranth leaves and 63.5 g carrots furnishing each of 1200 mg carotene showed percentage of Beta carotene of 77.8, 77.5 and 79.4 resp. with an increase in serum Beta carotene 120.2, 126.8 and 124.4 mg/100ml and serum retinol 35.5, 37.1 and 41.4 mg/100ml resp. in those given papaya fruit, amaranth and carrot. These supplements are not only less costly but also supply other nutrients. NGKR

- 480 Durnin (JVGA). Investigating the biological and social consequences of chronic nutritional energy deficiency. Food and Nutrition Bulletin 9(2); 1987; 49-61

- 481 Hoppner (K) and Lampi (B). Contribution of some fast food meals to the daily intake of pantothenic acid and biotin. Canadian Institute of Food Science and Technology Journal 20(3); 1987; 173-175

Pantothenic acid and biotin levels were determined in foods from four local fast food restaurants by microbiological assay. The mean contributions of the fast food meals with a regular portion of French fries and a soft drink to the daily intake of pantothenic acid (mg) and biotin (μ g) ranged between 0.9 to 2.1 and 2.5 to 4.8, resp. Substitution of a serving of milk or orange juice for the soft drink would augment the contributions towards the suggested recommended nutrient intake (RNI) for both vitamins. The contributions are discussed in terms of the Canadian daily suggested RNI for pantothenic acid and biotin. AS

- 482 Janabai Giri, Jeyanth (GP) and Kalyani (S). Evaluation of selenium and chromium content in selected foods. I. Indian Journal of Nutrition and Dietetics 24(6); 1987; 159-162

Selenium and chromium content have been estimated in the selected cereals and pulses as these are essential trace elements for human body. Rice (raw and parboiled) five var. each, two var. of wheat and five var. each of maize and ragi and four var. each of cholam (Jawar) and cumbu (common millet or *Panicum miliaceum*) were obtained from the market and analysed. The range of values (mg/g) for selenium and chromium content were maize 0.112-1.312, 0.006-0.020, in cumbu 1.450-1.868, 0.004-0.007, in ragi 1.675-2.062, 0.002-0.032, in jawar 1.250-1.793, 0.003-0.055, in raw rice 1.400-1.875, 0.003-0.012. Among these the var. containing highest chromium and selenium are given.

KAR

- 483 Laxmi Bhawani (M) and Sharada (D). Nutritional quality of the foods given during menarche. Indian Journal of Nutrition and Dietetics 24(6); 1987; 170-174

The nutritive values of the special foods given during menarche in Hindus, Muslims, and Christian communities was studied in a selected circle in Hyderabad city. Special diet is usually given during this menarche. The nutritive value of selected foods have been evaluated in these studies. These foods are rich in calories, Ca and Fe as well as proteins, which consist of usually kichidi, sesame laddus, dry coconut sesame-jaggery mix and sweets. Hot foods and non vegetarian foods were avoided completely. The regular diet given during menarche was contributing more than the recommended allowances of all the nutrients except protein which was in fair amounts. NGKR

TOXICOLOGY

- 484 Cherian (KM), Mulky (MJ) and Menon KKG). Toxicological considerations in the use of consumer products. Defence Science Journal 37(2); 1987; 143-159

This review covers different methods of screening carcinogens by using in vitro and in vivo carcinogenicity tests; naturally occurring carcinogens in food materials in working environment and consumer products like dyes; systemic hazards of various consumer products like oils, fats, protein foods. The effects of teratogen and hazards due to packaging materials is also considered. The need for safety in raw materials has been emphasised as an important factor for elimination of toxic effects. BV

- 485 Cook (J). carcinogenes in the laboratory. Disposal of waste from laboratories handling chemical carcinogens. Chemistry and Industry (12); 1987; 404-405

Discusses disposal of waste from laboratories handling chemical carcinogens. The waste, concn., quantity, handling precautions, treatment methods, disposal methods, choice of treatment or disposal, storage and recommendations are the aspects discussed. BV

- 486 Searle (CE). Identification of carcinogens. Chemistry and Industry (12); 1987; 408-411

Discusses carcinogenic potency, species differences, polycyclic aromatic hydrocarbons, aromatic amines and related compounds, inorganic carcinogens, N-nitros carcinogens, alkylating agents, halogenated compounds, benzene, formaldehyde, transplacental carcinogenesis, cancer on the world scale, occupation, smoking and diet, and carcinogens in the laboratory. BV

- 487 Srivatsa (AN) and Sharma (TR). Toxicology of processed and packaged foods. Defence Science Journal 37(2); 1987; 161-172

Briefly reviews the toxicology of additives, the migration of additives from packaging systems and naturally occurring toxic substances as possible health hazards. Natural contaminants, polycyclic hydrocarbons, pesticides, sweeteners (cyclamate, saccharin), nitrates and nitrites, antioxidants, monosodium glutamate, sulphiting agents, food colours, packaging materials (metals and polymers) are the

aspects covered. BV

Mycotoxins

Aflatoxins

- 488 Rama Devi (G) and Polasa (H). Interference in toxin production among toxigenic *Aspergillus* species. *Journal of Stored Products Research* 23(3); 1987; 149-150

This studies on interference in toxin production among three toxigenic *Aspergillus flavus* showed the interference exist when they were grown together on liquid medium or maize. It was seen that when *Aspergillus flavus* was grown in combination either with *A. ochraceus* or with *A. versicolor* only aflatoxin B₁ was produced but not ochratoxin A or sterigmatocystin. Similarly only ochratoxin A was produced when *A. ochraceus* and *A. versicolor* were grown together and growth of all three of the above fungi together yield only aflatoxin B. It is also found that by increasing the inoculum size of a particular species it did not encourage the production of more than one toxin in mixed cultures thereby suggesting toxin production of one species is interfered by an other species. NGKR

- 489 Warner (RL) and Pestka (JJ). ELISA survey of retail grain-based food products for zearalenone and aflatoxin B₁. *Journal of Food Protection* 50(6); 1987; 502-503

FOOD LAWS AND REGULATIONS

- 490 Barratt (B). Food legislation focus. *Food in Canada* 47(4); 1987; 16-18, 20, 22-26

This article explores the planned changes in the Food and Drug regulation in Canada. Considers regulations on fresh fruit and vegetables; processed products; seeds; maple products; honey; dairy products; processed poultry; processed egg; egg; beef carcass grading; hog carcass grading; veal carcass grading; lamb and mutton carcass grading; meat inspection; fish inspection; consumer packaging and labeling and food and drug regulations. BV

GENERAL

Nil

FOOD PROCESSING

- 91 Hawley (AH). The technology of natural liquid smoking. IFST Proceedings 19(2); 1986; 82-84

Briefly describes natural liquid smoke, major steps in the manufacturing process of liquid smoke, methods used to apply liquid smoke to a variety of food products, benefits of liquid smoke, current food applications and future opportunities. BV

- 492 Storey (RM). The technology of traditional smoking. IFST Proceedings 19(2); 1986; 58-62

Aspects covered include the process, smoking, smoking kilns, production of smoke, smoke deposition, smoke chemistry and drying. BV

FOOD PACKAGING

Packaging materials

Films

- 493 Hatzidimitriu (E), Gilbert (SG) and Loukakis (G). Odour barrier properties of multi-layer packaging films at different relative humidities. Journal of Food Science 52(2); 1987; 472-474

A method for quantitative evaluation of the aroma barriers of packaging materials has been developed in this study by testing a series of flexible plastic films of various compositions for their permeability to some flavouring and malodorous compounds. The studies on the permeation rates at 23 °C of some compounds for several composite films at 0% and 75% R.H showed that polyethylene vinyl alcohol and nylon combinations were found to be superior in barrier properties even at higher R.H. provided that moisture barrier films were present in the laminates. NGKR

FOOD ENGINEERING AND EQUIPMENT

Engineering

- 494 Benado (AL) and Rizvi (SSH). Water activity calculation by direct measurement of vapour pressure. Journal of Food Science 52(2); 1987; 429-432

- 495 Chen (CS). Relationship between water activity and freezing point depression of food systems. *Journal of Food Science* 52(2); 1987; 433-435
- 496 Kress-Rogers (E) and Kent (M). Microwave measurement of powder moisture and density. *Journal of Food Engineering* 6(5); 1987; 345-376

In this investigation a two-variable microwave technique has been described for moisture measurement in several brands of instant coffee and milk powder which is independent of density unlike microwave absorption method. By this method the error in the moisture measurement resulting from density variations is eliminated but also facilitates in-line detn. of the bulk density of the product. In this study the influence of temp. solids composition and particle size of the coffee and milk powders on the calibration characteristics is also reported. NGKR

- 497 Larkin (JW) and Steffe (JF). Experimental errors associated with the estimation of thermal diffusivity from thermal process data. *Journal of Food Science* 52(2); 1987; 419-424, 428
- 498 Pappas (G) and Rao (VNM). Computer codes and their application Development of a sampling plan for specified risks by microcomputers. *Journal of Food Processing and Preservation* 11(4); 1987; 339-345

This study was undertaken to illustrate the use of microcomputers in making quality control techniques easier to perform. There are standard plans available based on some specified acceptable quality level and corresponding producers' risk. It is found possible with the wide spread use of microcomputers to specify more than one point on the operational characteristic curve and obtain the sample size and acceptance number. This study involved the development of a numerical solution based on specifying two points on the above curve. An algorithm coded in (compiled to machine language) was developed to yield the sampling plan and corresponding plot of this curve. NGKR

- 499 Pflug (IJ). Calculating F_T -values for heat preservation of shelf-stable, low-acid canned foods using the straight-line semilogarithmic model. *Journal of Food Protection* 50(7); 1987; 608-615, 620
- 500 Steele (RJ). Use of polyols to measure equilibrium relative humidity. *International Journal of Food Science and Technology* 22(4); 1987; 377-384

Polyols were used to estimate the equilibrium relative humidity (ERH) of foods. Glycerol, ethylene glycol and propylene glycol were found to be suitable for estimating ERH, up to 93%, by measuring the refractive index after they had equilibrated in the headspace of a food. The ERH determined by the polyol method agreed with the ERH determined using Sina and Vaisala meters to within 1% ERH for a lithium sulphate slurry. The ERH of prunes determined using the Vaisala meter was about 6% lower than the value obtained by the other methods. Unlike most electronic techniques the polyol method was unaffected by the presence of glycerol, propylene glycol or butylene glycol and so is suitable for measuring the ERH of foods containing these humectants. The polyol method can be used in developing countries where access to sophisticated equipment is limited. AS

Equipments

Extrusion cookers

- 501 Abbott (P). New developments in cooker-extruders. *Cereal Foods World* 32(11); 1987; 816-819

In this article the coextruded products of the tubular type where the outer component is produced by a cooker extruder and the inner component is a pumpable product that will not flow freely at ambient temp. is discussed. BV

Mixers

- 502 Sluimer (P). Exploring the performance differences in spiral mixer design and operation. *Industrie Alimentari* 26(5); 1987; 475-479 (It).

Spectrometers

- 503 Pearson (RM), Ream (LR), Job (C) and Adams (J). The use of small NMR spectrometers for on-line process control. *Cereal Foods World* 32(11); 1987; 822-826

ENERGY IN FOOD PROCESSING

- 504 Lin (B-F), Miyawaki (O), Torikata (Y) and Yano (T). Energy saving in the extraction-denaturation stage of Kori-Tofu production and its optimization. *Journal of Food Engineering* 6(5); 1987; 333-344

In this investigation four methods of milling-extraction-denaturation are studied for their feasibility as alternatives for saving energy. It is known that production of Kori-tofu involves 13 unit operations and is highly energy intensive. One of the methods studied involves a double extraction and a high temp. milling. By using double extraction method the thermal energy consumption on extraction-denaturation could be reduced to one quarter or even less of that of the traditional method without affecting the product yield. By combining room temp. milling with double extraction the total cost could be reduced by 15-20%. NGKR

FOOD CHEMISTRY AND ANALYSIS

- 505 Mosandi (A) and Deger (W). Stereoisomeric flavour compounds. XVII. Chiral carboxylic esters - Synthesis and properties. *Zeitschrift fur Lebensmittel-Untersuchung und -Forschung* 185(5); 1987; 379-382 (De).
- 506 Papavergou (E) and Clifford (MN). Possible chemical interactions between woodsmoke constituents and foods. *IFST Proceedings* 19(2); 1986; 63-67

The presence of cyclic derivatives of amines (thiazolidines, thiazolidine carboxylic acids, tetra hydro-Beta-carbolines (THBC), spinacines and spinaceamines) and amino acids in smoked foods, particularly smoked fish and cheese is discussed. BV

Chemistry(Analytical)

- 507 Jackman (RL), Yada (RY) and Tung (MA). Separation and chemical properties of anthocyanins used for their qualitative and quantitative analysis: Review. *Journal of Food Biochemistry* 11(4); 1987; 279-308

This review discusses various methods of separation and chemical properties of anthocyanins used for their qualitative and quantitative analysis, identification procedures and vital information regarding the nature and reactivity of those pigments in complex food systems. NGKR

- 508 Robards (K) and Dilli (S). Analytical chemistry of synthetic food antioxidants: A Review. *Analyst* 112(7); 1987; 933-943

A review is presented (upto 1986) of the literature relating to analytical chemistry applied to the five most common synthetic food antioxidants (BHA, BHT, NDGA, Propyl gallate and TBHQ). Recovery procedures for antioxidants, quantification of antioxidants (colorimetry, spectrophotometry methods in the ultraviolet region, paper and thin-layer chromatography and GC), and methods based on HPLC are reviewed. 190 references. BV

- 509 Ziegler (GR), Benado (AL) and Rizvi (SSH). Determination of mass diffusivity of simple sugars in water by the rotating disk method. *Journal of Food Science* 52(2); 1987; 501-502

For determining the mass diffusivity of solid food components in liquid solutions the rotating disc method is shown to be an accurate method. By this method the diffusivities of sucrose and glucose in water determined to be 0.50 and 0.66 ($\text{m}^2/\text{sec} \times 10^9$) at 25 °C with activation energies of 36.3 and 31.6 kJ/g-mole resp. NGKR

FOOD MICROBIOLOGY AND HYGIENE

- 510 Ackland (MR) and Manvell (PM). A non-impedimetric electrical method for detecting and enumerating microorganisms. *Food Microbiology* 4(2); 1987; 127-131

In this paper a non-impedimetric electrical technique has been described which enables the rapid detection and enumeration of microorganisms during growth. Five bacterial strains demonstrated a linear response over a wide dilution range when calibrated against traditional methods. By this technique the growth of a wide range of organisms was detected. NGKR

- 511 Debevere (JM). The use of buffered acidulant systems to improve the microbiological stability of acid foods. *Food Microbiology* 4(2); 1987; 105-114

The objective of these investigations was to evaluate the anti-microbial effect of buffered growth medium at pH 4.5 containing 1% organic acid like acetic acid, citric acid and lactic acid on *Yersinia lipolytica* and *Lactobacillus brevis* isolated from industrial sauces and salads in laboratory and the results of the findings applied to salads in industrial scale. It was found that the inhibition of the growth

of microorganisms depends not only on the pH of the substrate but also on the kind of acidulant used to adjust the pH and its concn. Industrial salads containing approx. 1% acetic acid and 1% lactic acid in the aqueous phase and buffered to pH 4.85-4.95 showed to have a greater microbiological stability than the unbuffered salads and the use of these buffered acids in salads and acid foods in general may in the future lead to the omission of chemical preservatives such as benzoic acid and sorbic acid. NGKR

Enzymes

Glucose oxidases

- 512 Parker (JW) and Schwartz (CS). Modeling the kinetics of immobilized glucose oxidase. *Biotechnology and Bioengineering* 30(6); 1987; 724-735

Ethyl alcohol

- 513 Alexander (MA), Chapman (TW) and Jeffries (TW). Continuous ethanol production from D-xylose by *Candida shehatae*. *Biotechnology and Bioengineering* 30(5); 1987; 685-691

The aerobic mode of ethanol production by *Candida shehatae* has been studied because high fermentation rates are obtained with low aeration using this organism. MVG

- 514 Anselme (MJ) and Tedder (DW). Characteristics of immobilized yeast reactors producing ethanol from glucose. *Biotechnology and Bioengineering* 30(6); 1987; 736-745

The evolutionary performance of upflow reactors are affected by the cell immobilization matrix and the matrix particle size distribution. Higher productivities are obtained using a low-density brick with a particle size of ca. 400-1400 μm . A medium condition favouring growth quickly leads to large biomass gradients within the reactors and eventually, reductions in average productivities due to bed plugging. These systems can be accurately modelled using Monod kinetics when dispersion and the biomass gradient are considered. The productivity was apparently not controlled by substrate diffusion in these cases. AS

Algae

Spirulina

- 515 Cohen (Z), Vonshak (A) and Richmond (A). Fatty acid composition of *Spirulina* strains grown under various environmental conditions. *Phytochemistry* 26(8); 1987; 2255-2258

The fatty acid distribution in 19 strains of *Spirulina* was studied. All but one contained Gamma-linolenic acid (GLA). No GLA was found in *S. subsalsa*, which had a very high content of palmitoleic acid. The fatty acid content of all but one of the tested strains increased with cultivation temp. and the relative amount of polyunsaturated fatty acid decreased. The highest content of GLA was found at 30-35 °C for most strains. High light intensities at a high temp. (38 °C), while not affecting the fatty acid composition, had a drastic effect on the fatty acid content, reducing it by as much as 46%. AS

Bacteria

Lactobacillus

- 516 McDonald (LC), McFeeters (RF), Daeschel (MA) and Fleming (HP). A differential medium for the enumeration of homofermentative and heterofermentative lactic acid bacteria. *Applied and Environmental Microbiology* 53(6); 1987; 1382-1384

A medium was developed for the differential enumeration of homofermentative and heterofermentative lactic acid bacteria. Essential components of the medium included fructose (14mM), potassium hexametaphosphate (18mM), bromocresol green (as a pH indicator), and other nutrients to support growth. In agar medium, homofermentative colonies were blue to green, while heterofermentative colonies remained white. A total of 21 *Lactobacillus*, *Pediococcus*, *Leuconostoc*, and *Streptococcus* sp. were correctly classified with the medium. AS

Salmonella

- 517 Thayer (DW), Muller (WS), Buchanan (RL) and Phillips (JG). Effect of NaCl, pH, temperature, and atmosphere on growth of *Salmonella typhimurium* in glucose-mineral salts medium. *Applied and Environmental Microbiology* 53(6); 1987; 1311-1315

Staphylococcus aureus

- 518 Martin (SE) and Chaven (S). Synthesis of catalase in *Staphylococcus aureus* MF-31. *Applied and Environmental Microbiology* 53(6); 1987; 1207-1209

The catalase production during growth of *S. aureus*, the sensitivity of catalase-negative mutants to hydrogen peroxide, and the heat sensitivity of catalase-negative mutants were examined. MVG

- 519 Tham (W) and Hajdu (LJ). A comparison of six media for isolating *Staphylococcus aureus* from foods. *Food Microbiology* 4(2); 1987; 133-146

Six culture media were compared with blood agar regarding colony counts and colony diameters of 53 *Staphylococcus aureus* strains. There were no statistically significant differences between the media. The forced differentiation of the results via cluster analysis, however, gave some indications that differences existed. In terms of colony counts, LSM, BP Oxoid and BP Oxoid + pp gave results similar to those given by blood agar. Colony diameter seemed to be a doubtful measure of the media's suitability and none of the six media showed similar diameter values to those of blood agar. As regards the appearance of the *S. aureus* strains on the six media, BP BBL and LSM corresponded the most closely to the inventors descriptions. The selectivities of the media were tested by cultivating 102 food samples from various sources. The most favourable retardation against microorganisms other than *S. aureus* was shown by BP BBL, KRANEP and LSM. In terms of all tests performed, BP BBL was the most satisfactory medium for isolating *S. aureus*. PCVJ was the poorest of all media used in this study. AS

Streptococcus lactis

- 520 Von Wright (A) and Tynkkynen (S). Construction of *Streptococcus lactis* subsp. *Lactis* strains with a single plasmid associated with mucoid phenotype. *Applied and Environmental Microbiology* 53(6); 1987; 1385-1386

Lactose-fermenting mucoid ($\text{Lac}^+ \text{Muc}^+$) variants of plasmid-free *Streptococcus lactis* subsp. *lactis* MG1614 were obtained by protoplast transformation with total plasmid DNA from Muc^+ *S. lactis* subsp. *cremoris* ARH87. By using plasmid DNA from these variants for further transformations followed by novobiocin-induced plasmid curing, $\text{Lac}^+ \text{Muc}^+$ MG1614 strains containing only a single 30-megadalton plasmid could be constructed. This plasmid, designated pVS5, appeared to be associated with the *Muc* phenotype. AS

Yersinia enterocolitica

- 521 Brackett (RE). Effects of various acids on growth and survival of *Yersinia enterocolitica*. *Journal of Food Protection* 50(7); 1987; 598-601

The relative effects of different acids on growth and survival of *Y. enterocolitica* has been determined. In addition, methods of presenting survival data are compared. MVG

Fungi

Aspergillus oryzae

- 522 Annunziato (ME) and Mahoney (RR). Partial purification and characterization of Alpha-galactosidase from *Aspergillus oryzae*. *Journal of Food Biochemistry* 11(4); 1987; 263-277

This investigation was carried out to partially purify the enzyme from a strain of *A. oryzae* and determine some of its characteristics so as to assess its potential for use in food processing. The results showed that Alpha-galactosidase preparation free of protease activity and capable of hydrolysing the Alpha-galacto-oligosaccharides in soy milk can be produced in a simple two step process from an extract of fermented wheat bran. Separation of the invertase component is more difficult and the preparation is therefore not suitable for sugar beet syrup processing. NGKR

Mushrooms

- 523 Nwokolo (E). Composition of nutrients in the sclerotium of the mushroom *Pleurotus tuber regium*. *Qualitas Plantarum - Plant Foods for Human Nutrition* 37(2); 1987; 133-139

A tuberous sclerotium of the mushroom *Pleurotus tuber regium* was analysed for proximate, amino acid and mineral content. The sclerotium had low protein, ether extract, amino acid and mineral content compared to the pileus of the same mushroom and similar mushrooms. Cystine, methionine, serine, arginine and lysine were exceptionally low. Because the sclerotium is milled with melon seeds in traditional preparation of a vegetable meat-substitute, nutrient intake of a human subject consuming 100 g of the meat-substitute was compared to intake

of one consuming 100 g of stewed broiler meat. The meat-substitute provided more minerals than broiler meat but only a fraction (40-65%) of the amino acids of broiler meat. AS

- 524 Surinrut (P), Julshamn (K) and Njaa (LR). Protein, amino acids and some major and trace elements in Thai and Norwegian mushrooms. *Qualitas Plantarum - Plant Foods for Human Nutrition* 37(2); 1987; 117-125

Yeasts

- 525 Michel (A), Jacob (F), Perrier (J) and Poncet (S). Yeast production from crude sweet whey. *Biotechnology and Bioengineering* 30(6); 1987; 780-783
- 526 Schaertel (RJ), Tsang (N) and Firstenberg-Eden (R). Impedimetric detection of yeast and mold. *Food Microbiology* 4(2); 1987; 155-163

Candida utilis

- 527 Han (YW). Oxygen requirement for growth of *Candida utilis* on semisolid straw substrate. *Biotechnology and Bioengineering* 30(5); 1987; 672-674

The oxygen demand level of *Candida utilis* grown on semisolid straw has been determined by measuring the growth rate of the organism under various levels of oxygen supply. MVG

BIOTECHNOLOGY

- 528 Bednarczyk (NE) and Bruns (P). Commercializing products of the new biotechnology. *Cereal Foods World* 32(10); 1987; 770-771

Discusses the problem of commercializing the products of the new biotechnology. BV

- 529 Jaworski (EG). The impact of biotechnology on food production. *Cereal Foods World* 32(10); 1987; 754, 756-757

Focus on the recent advancements in transformation of plants. Aspects covered include cell transformation system, plant transformation system, gene expression, technology applications (plants and microbes) and future needs and expectations. BV

- 530 Lawrence (RH Jr). New applications of biotechnology in the food industry. *Cereal Foods World* 32(10); 1987; 758-765

This paper reviews new applications of biotechnology in the following food related areas: enzymes (food industry uses, alpha-amylase-high fructose corn syrup industry, rennin (chymosin)-dairy industry), cheese and fermented dairy food production, brewing and wine making, agricultural raw materials (crop plants) genetic improvement strategies, new genetic techniques, somaclonal variation, somatic cell genetic methods, gamete culture, protoplast fusion techniques, gene transfer technology, functional attribute genetics, production - side versus utilization-side genetics, and plant cell bioreactors), animal biotechnology and biotechnology research in the food industry. BV

- 531 Stewart (GG) and Russell (I). Yeast biotechnology in the food and beverage industries. *Cereal Foods World* 32(10); 1987; 766-769

Discusses various techniques that are available for manipulating industrial strains and cites examples of research in areas previously conducted. Hybridization, rare mating, spheroplast fusion, mutation and selection and recombinant DNA are the aspects covered. BV

- 532 Stronach (SM), Diaz-Baez (MC), Rudd (T) and Lester (JN). Factors affecting biomass attachment during startup and operation of anaerobic fluidized beds. *Biotechnology and Bioengineering* 30(5); 1987; 611-620

Three anaerobic fluidised bed reactors at 37 °C were utilised in the study. The influences of synthetic polymer addition and maintenance of anaerobiosis during start up were investigated using a meat based synthetic waste and stepped loading regime. Subsequently, increasing bed expansions were applied to assess shear stress. Biomass retention was improved but there was no improvement in process performance on addition of synthetic polymer. Maintenance of a reduced environment ameliorated fluctuating process parameters and aided biomass retention and substrate removal. A bed expansion of 5% was detrimental to biomass attachment and COD removal; however, expansion between 10% and 30% in maintained system stability and start up was achieved in 56 days. Anaerobiosis enhanced the initial evolution of a stable, well adapted microbial population while polymer addition interfered with this. Moderate bed expansion has negligible effects on attachment and performance. MVG

TISSUE CULTURE

Nil

FOOD ADDITIVES

Colorants

Dyes

- 533 Clonis (YD), Stead (CV) and Lowe (CR). Novel cationic triazine dyes for protein purification. *Biotechnology and Bioengineering* 30(5); 1987; 621-627

The first application of a novel reactive cationic dye to the isolation and purification of proteins which interact with cationic ligands, is described. The interaction of four familiar proteases, a typical oxido-reductase and human serum albumin with the immobilised cationic dye and several amphoteric and anionic dyes was studied. The effectiveness of the new reactive dyes for the purification of proteolytic enzymes was assessed. MVG

Flavourings

- 534 Hauser (A) and Maurer (B). On the natural occurrence of certain flavour compounds. *Zeitschrift für Lebensmittel-Untersuchung und -For-*

schung 184(6); 1987; 500-502

The following flavour compounds were identified by GC-MS from natural sources: (E)-cinnamyl formate (cinnamon), (E)-cinnamyl propionate (cinnamon), (E)-cinnamyl isobutyrate (cinnamon), isobutyl (E)-cinnamate (cinnamon, styrase), isopentyl (E) cinnamate (cinnamon, styrase), 2-methylbutyl (E)-cinnamate (cinnamon, styrase), isobutyl phenylacetate (cacao), and 1-phenylethyl isobutyrate (rum). BV

Stabilizers

Gelatin

- 535 Nishio (T) and Hayashi (R). Modification of physical properties of gelatin by use of an immobilized protease in combination with molecular sieves. *Journal of Food Science* 52(2); 1987; 464-466, 474

These studies showed that the gelatins with low viscosity could be prepared with minimum amount of changes in gel strength by the use of immobilized subtilisin which was covalently bound by the glutaraldehyde method on glass bead supports with mean pore sizes of 170, 350 and 500 Å. This procedure enables one step adjustment of viscosity and/or gel-strength of commercial gelatin. NGKR

Gels

- 536 Pappas (G), Rao (VNM) and Smit (CJB). Development and characteristics of modified agar gels. *Journal of Food Science* 52(2); 1987; 467-471

In this study modified agar was produced using freeze-drying or drum drying which will dissolve in warm water (55 °C) to form a stable gel upon cooking and its functional properties were related to the microstructure of each product. As icing formulations use in bakery and confectionery industries have storage problems the use of stabilizers like agar is found to be a costly proposition. The two modified products when compared with control sample to determine differences in gel formation, gel strength, viscosity and microstructure it was found that the agar modified by drum drying dissolved at 55 degree C and gel characteristics were similar to the gel made with unmodified agar heated to 100 °C. NGKR

Sweeteners

Aspartame

- 537 Sharma (RP) and Coulombe (RAJr). Effects of repeated doses of aspartame on serotonin and its metabolite in various regions of the mouse brain. *Food and Chemical Toxicology* 25(8); 1987; 565-568

Male CD-1 mice were given a daily oral dose of 0, 13, 133, 133 or 650 mg/kg for 30 days and 1 day after the last dose the animals were decapitated and their brain regions were quickly isolated. Analyses of the different regions for catecholamine and indoleamine neurotransmitters and their major metabolites indicated that the increases in adrenergic chemicals observed shortly after a single exposure were not apparent after repeated dosing. In contrast, concn. of serotonin and its metabolite, 5-hydroxyindoleacetic acid, were decreased in several regions. An increased supply of phenylalanine

may be responsible for a decrease in tryptophan uptake by the brain tissue or for a depression in tryptophan conversion to serotonin. AS

CEREALS

Barley

- 538 Sisler (WW). A look at two-row malting barley in Canada. Technical Quarterly, Master Brewers' Association of the Americas 24(2); 1987; 55-57

Rice

Rice flour

- 539 Iwamoto (M), Suzuki (T), Kongserree (N), Uozumi (J) and Inatsu (O). Analysis of protein and amino acid contents in rice flour by near-infrared spectroscopy. Journal of Japanese Society of Food Science and Technology '(Nippon Shokuhin Kogyo Gakkaishi)' 33(12); 1987; 848-853

Near-infrared (NIR) spectroscopic technique was studied for detn. of protein and 4 kinds of amino acids in rice flour. As a result of detailed search for the NIR spectra of rice flour containing different protein level, the NIR was proved to have a sensitivity to rice protein as much as wheat one. It was possible to decrease a standard error of estimation for calibrations by using a derivative absorbance, but on the contrary derivative procedure possibly makes an increment in bias in case of prediction of "unknown" samples. It was verified that the NIR technique had a potential for a rapid method for analysis of protein and amino acids contents in rice flour. AS

Wheat

- 540 Dexter (JE), Matsuo (RR) and Martin (DG). The relationship of durum wheat test weight to milling performance and spaghetti quality. Cereal Foods World 32(10); 1987; 772-777
- 541 Harmuth-Hoene (A-E), Bogner (AE), Kornemann (U) and Diehl (JF). The influence of germination on the nutritional value of wheat, mung beans and chickpeas. Zeitschrift für Lebensmittel-Untersuchung und -Forschung 185(5); 1987; 386-393 (De).

The effect of germination on nutritional values of wheat, mung bean (*Phaseolus aureus*, *Vigna radiata*) and chickpeas is studied. The water uptake during 4 days of germination varied from 159 g/100 g (chickpeas) to 450 g/100 g (mung beans). Loss of dry matter and carbohydrates was observed in all the three seeds. Phytic acid was partially hydrolysed in wheat and mung beans. The total fat content decreased in mung beans. Increases in the content of polyunsaturated fatty acids in wheat and of dietary fibre in wheat and mung beans was observed. Limiting amino acids showed a measurable rise in wheat and mung beans. Frequent watering during germination resulted in loss of Fe (9-21%), K (27% in chickpeas) and Ca (17% in chickpeas). Results also indicated accumulation of vitamin B6 and B1. The nutritional values of the three seeds improved to various extents, noticeably in wheat and least in chickpeas. BV

- 542 Nadeau (DB) and Clydesdale (FM). Effect of acid pretreatment on the stability of EDTA, cysteine, lactic and succinic acid complexes of various iron sources in a wheat flake cereal. *Journal of Food Protection* 50(7); 1987; 587-597

Wheat bran

- 543 Mani (I) and Mani (UV). Effect of wheat bran supplementation on blood sugar, glycosylated protein and serum lipids in NIDDM subjects. *Qualitas Plantarum - Plant Foods for Human Nutrition* 37(2); 1987; 161-168

The distribution of cholesterol in different lipoproteins and also the effects of bran supplementation on the glycemic and lipidemic control of diabetic patients (NIDDM type) after a long term supplementation trial is presented. Wheat bran supplementation for a period of 2 months failed to register any response on serum lipids serum macromolecular glycosylation levels. BV

Wheat flour

- 544 Iwamoto (M), Kongsersee (N), Uozumi (J) and Suzuki (T). Determination of ash content in home-grown wheat flour in Japan by near-infrared diffuse reflectance analysis. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi)' 33(12); 1987; 842-847

Ash content is one of matters of concern in a viewpoint of breeding for Japanese home-grown wheat. A near-infrared diffuse reflectance (NIR) technique was applied to detn. of ash in 60% extraction flours from 2 var. of the wheat. A distinct tendency that flour of a finer particle size has a higher ash content was observed in the NIR spectrum, resulting in an unstable property of diffuse reflectance which was affected by mutual interaction of moisture in the flour with its flour particle. As a result of calibrations performed, the most accurate calibration was obtained with a multiple linear regression analysis using second derivative of absorbances at 4 specific wavelengths involving an absorbance at 2344 nm which was assigned to a bran-related substance in the flour. It is possible to determine ash indirectly in connection with an inclusion of the bran-related fraction in the flour. However, prediction of ash in "unknown" wheat flours from different varieties from those used for performing the calibration resulted in serious errors on account of a bias effect between the var. AS

Wheat proteins

- 545 Wieser (H), Modl (A), Sellmeier (W) and Belitz (H-D). High-performance liquid chromatography of gliadins from different wheat varieties. Amino acids composition and N-terminal amino acid sequence of components. *Zeitschrift für Lebensmittel-Untersuchung und -Forschung* 185(5); 1987; 371-378

MILLETS

Corn

Corn proteins

- 546 Oniang'o (RK), Kayongo-Male (H) and Saint-Hilaire (P). The nutritive value on WPC in rations containing maize and bean proteins. *Nutrition Reports International* 36(2); 1987; 345-356

This study has been carried out to find out suitable substitutes like cereal mixtures for breast feeding to infants and also develop most economical mixtures as animal protein sources are expensive and unsuitable for developing countries. In this connection varying levels of whey protein conc.(WPC) were incorporated with maize meal at different levels ranging from 0.0 to 23.6%. The bean meal decreased as WPC increased. The results showed that average daily gain and daily feed intake increase with increasing levels of WPC in the diet. The faecal N excretion was found to be lowest on rations containing animal proteins, WPC and casein thereby showing the importance of animal protein consumption however small to enhance palatability as plant proteins most consumed in developing countries are poorly utilized. NGKR

Ogi

- 547 Adeyemi (IA), Osunsami (AT) and Fakorede (MAB). Effect of corn varieties on ogi quality. *Journal of Food Science* 52(2); 1987; 322-324

This investigation is carried out to find out the yield and evaluate the quality of ogi samples prepared out of corn var. from Nigeria. Six samples were assessed for kernel wt. and proximate composition and the quality of processed ogi was evaluated using Brabender Amylograph and an Adams consistometer. The results showed that the kernel wt. varied between 23.1 and 28.5 g, the yield of ogi ranged from 51-60% with Farz 27 and TZSR-W var. giving the highest yield. TZE-4 recorded the highest amylograph peak viscosity of 615 B.U. while Farz 27 was the most stable with a value of 115 B.U. and TZSR-W recording 980 B.U. for gelatinisation index. Adams consistometer is found useful for the above ogi evaluation. NGKR

Pearl millets

- 548 Dhankher (N) and Chauhan (BM). Effect of temperature and period of fermentation on protein and starch digestibility (in vitro) of rabadi - A pearl millet fermented food. *Journal of Food Science* 52(2); 1987; 489-490

The effects of different temp. and time of fermentation on protein and starch digestibility (in vitro) of rabadi, a traditional fermented food consumed regularly by people in the Northwestern pearl millet producing region of India was investigated. It was observed that as fermentation time increased protein as well as starch digestibility (in vitro) of rabadi increased significantly at all temp. Max. increase in the digestibility of both protein (51%) and starch (58%) occurred after 9 h fermentation at 45 °C. NGKR

PULSES

- 549 Moore (KJ), Johnson (MG) and Sistrunk (WA). Effect of polyelectrolyte treatments on waste strength of snap and dry bean wastewaters. *Journal of Food Science* 52(2); 1987; 491-492

Black beans

- 550 Aguilera (JM), Roman (J) and Hohlberg (A). Engineering and quality aspects of particle-to-particle heat transfer to black beans. *Journal of Food Processing and Preservation* 11(4); 1987; 263-276

The present study was carried out to determine some engineering parameters important in particle-to-particle heat transfer to black beans (*Phaseolus vulgaris*) in a hot sand roaster and evaluate its application in drying, enzyme inactivation and disinfestation. Results showed that roasting mature beans at different moisture levels was effective for inactivating peroxidase, enzyme believed to be involved in deteriorative reactions in dry beans. Infestation was also controlled with a mild roasting, particle-to-particle roasting proved to be a simple and effective pre-treatment to preserve quality of dry beans during storage. NGKR

Cowpeas

- 551 Laurena (AC), Garcia (VV) and Mendoza (EMT). Effects of heat on the removal of polyphenols and in vitro protein digestibility of cowpea (*Vigna unguiculata* (L) Walp). *Qualitas Plantarum - Plant Foods for Human Nutrition* 37(2); 1987; 183-192

Simple wet heat treatments like simple boiling (atmospheric pressure, 100 C) and pressurized boiling (higher than 100 C) reduced the polyphenol content of mature dark red seeds of cowpea (*Vigna unguiculata* (L.) Walp.) cultivar UPL Cp 3 by 61 to 80% and improved in vitro protein digestibility (IVPD) by 6 to 26%. Pressurized steaming (higher than 100 C) removed 48 to 83% of the polyphenols but increased IVPD by only 1.1 to 4.2%. Dry heat as exemplified by roasting and microwave treatment inactivated 58 to 71% of the tannins but increased IVPD by only 1%. All the heat treatments were effective in inactivating polyphenols though different responses were observed with the resulting in vitro protein digestibilities. AS

Dry beans

- 552 Deshpande (SS) and Cheryan (M). Determination of phenolic compounds of dry beans using vanillin, redox and precipitation assays. *Journal of Food Science* 52(2); 1987; 332-334

In this investigation the effectiveness of various methods for analysis of dry beans for tannins has been studied. The phenolic compounds of 10 types of dry beans (*Phaseolus vulgaris* L) were estimated using 4 different methods. Different methods like 0.5% vanillin assay, protein precipitable phenol, Prussian blue, Folin-Ciocalteu assays gave different values. Although tannin values varied from 2 to 3 times for a given var. excellent correlation was observed between the various methods for dry bean tannin analysis. NGKR

Green beans

- 553 Hamblin (CL), Heil (JR), Merson (RL), Bernhard (RA) and Patino (H). Comparing flame and mechanical deaeration of high vacuum canned green beans and apple slices. *Journal of Food Science* 52(2); 1987; 425-428

This investigation was carried out to compare the effectiveness of flame deaeration and mechanical deaeration of cut green beans and sliced apples and to document performance in terms of both can vacuum levels and the actual headspace oxygen content as estimated by gas chromatography. Results obtained were found to be comparable and the noncondensable gases are removed from low liquid packs of the above materials. The residual headspace oxygen was calculated from experimental measurements of pressure, void volume and oxygen percentage. Prolonged exposure of hot filled samples (more than 5 sec) to mechanical vacuum prior to seaming did not result in lower residual oxygen. It was also found that sample changes during a period of 9 months were not affected by deaeration method. Residual oxygen or vacuum in cooled samples soon after sampling may be used to assess efficiency of air removal. NGKR

Haricot beans

- 554 Gatehouse (AMR), Dobie (P), Hodges (RJ), Meik (J), Pusztai (A) and Boulter (D). Role of carbohydrates in insect resistance in *Phaseolus vulgaris*. *Journal of Insect Physiology* 33(11); 1987; 843-850

The bruchid beetles *Acanthoscelides obtectus* (Say) and *Zabrotes subfasciatus* Boheman, are major storage pests of the economically important legume *Phaseolus vulgaris* (Haricot bean). In the present study, resistance of a wild line of *P. vulgaris*, G12953, towards these two insects is confirmed. At a concn. of 4%, the approx. physiological concn. within the seed, the heteropolysaccharide fraction from the resistant line was very toxic resulting in 80-85% larval mortality of *A. obtectus* with an LC of 2.5%. Furthermore, surviving larvae showed a marked increase in their development period. The corresponding fraction from a susceptible line, on the other hand, even at twice the physiological concn., had a negligible effect upon larval development both in terms of adult emergence and development period. The effect of albumin proteins and globulin proteins on larval development of *A. obtectus* were also tested by incorporation into artificial beans at a range of concn. up to 10%. Whilst those from the susceptible line had little effect upon development both the albumins and globulins from the resistant line were found to cause a slight decrease in adult emergence and a small increase in the median development period. These effects, however, are not sufficient to account for the observed seed resistance of G12953. It is concluded that this example of insect resistance in seeds of *P. vulgaris*, line G12953, is due, at least in part, to the presence of a heteropolysaccharide which has an unusually high arabinose and fructose content. In the absence of other antimetabolic compounds the levels of this heteropolysaccharide present in G12953 are sufficiently high to account for the observed resistance. However, it is possible regarding seed resistance towards *Z. subfasciatus*, that Alpha-amylase inhibitors may be having a synergistic effect. AS

Lupins

- 555 Schoeneberger (H), Moron (S) and Gross (R). Safety evaluation of water debittered Andean lupins (*Lupinus mutabilis*): 12-week rat-feeding study. *Qualitas Plantarum - Plant Foods for Human Nutrition* 37(2); 1987; 169-182

Results of a 12-week feeding test with rats of traditionally debittered lupin grains of the species *Lupinus mutabilis* did not give any indication against the use of the water extracted grains in human and animal nutrition. BV

Peas

- 556 Dagorn-Scaviner (C), Gueguen (J) and Lefebvre (J). Emulsifying properties of pea globulins as related to their adsorption behaviors. *Journal of Food Science* 52(2); 1987; 335-341

In this study the emulsifying properties of pea globulins and of vicilin-Legumin mixtures have been evaluated through their emulsifying capacity, emulsifying activity index, and stability of the resulting emulsions. The results showed the influence of the vicilin/legumin ratio on the efficiency of pea isolates as emulsifying agents and the vicilin has been shown to be more surface active at air/water and dodecane/water interfaces and is found to be responsible to better emulsifying properties than legumin. It has also been seen that the globulin composition of the isolates did not completely explain their emulsifying properties. NGKR

- 557 Everson (HP) and Geeson (JD). Effect of packaging methods on quality of mangetout peas during shelf life. *International Journal of Food Science and Technology* 22(4); 1987; 417-422

This study compares changes in the composition of the internal atm in retail packs of mangetout peas over-wrapped with a currently used film or with a range of alternative stretch over-wrapping materials, and describes the effect of these packaging methods on quality changes of pods during simulated distribution and marketing. BV

Winged beans

- 558 Kadam (SS) and Smithard (RR). Effects of heat treatments on trypsin inhibitor and hemagglutinating activities in winged bean. *Qualitas Plantarum - Plant Foods for Human Nutrition* 37(2); 1987; 151-159

Trypsin inhibitor extracted from winged bean meal was stable at 60 °C for 60 min. At 80 °C, the activity of the extracted inhibitor decreased by 25% within 5 min, and continued to decline gradually to a loss of 45% of activity after 30 min. When the extracted inhibitor was incubated at 100 °C it exhibited a triphasic pattern of inactivation. The winged bean extract incubated at 60 °C lost 60% of its hemagglutinating activity within 30 min. At 80 °C, there was a complete loss of activity within 5 min. The microwave treatment to winged bean meal had no effect on trypsin inhibitor or hemagglutinating activities in the meal. However, infrared treatment to winged bean seed for 60 seconds was effective in destroying most of the trypsin inhibitor and hemagglutinating activities. Autoclave treatment

(120 °C at 15 lb pressure) for 10 min inactivated trypsin inhibitor and hemagglutinin in winged bean meal almost completely. Cooking of presoaked beans in boiling water for 30 min was effective in destroying most of the trypsin inhibitor and hemagglutinating activities. AS

OILSEEDS AND NUTS

Almonds

- 559 Brieskorn (CH) and Betz (R). Sterols of almond seed coat. *FAT Science and Technology* 89(6); 1987; 230-235 (De).

Additionally to seven sterols known from the almond seed oil the nonsaponifiable part of the greasy oil of almond seed coats contains 24-methylen-cholesterol (6), fucosterol (8) and sitosterol and stigmasterol glucopyranosyl ethers. The campesterol concn. was eight fold compared to the seed oil. Saturated sterols were not present. Amongst the expected oxidation products (24R)-stigmast-5-en-3 Beta-yl formiate (10) and (24R)-stigmast-5-en-3-on dimethylacetal (11) have been identified, which both should be artefacts. AS

Groundnuts

- 560 Bhavanishankar (TN), Rajashekaran (T) and Sreenivasa Murthy (V). Tempeh-like product by groundnut fermentation. *Food Microbiology* 4(2); 1987; 121-125

In this study investigation was made to increase the nutritive value of defatted groundnut for human consumption. Fermentation was carried out using two strains of *Rhizopus oligosporus*. Results showed that fermentation increased the soluble solids, amino-nitrogen and soluble nitrogen while there was no change in the crude fibre content whereas in the samples fermented with the strain NRRL 2549 the amino nitrogen, soluble solids, free lysine and methionine contents were highest and consequently protein efficiency ratio (PER) of the product increased significantly. NGKR

- 561 Candlish (AAG), Stimson (WH) and Smith (JE). The detection of aflatoxin B₁ in peanut kernels, peanut butter and maize using a monoclonal antibody based enzyme immunoassay. *Food Microbiology* 4(2); 1987; 147-153

This method requires a single extraction step allowing detection levels of 5 p.p.b aflatoxin B₁ and this could be further developed for large scale screening of samples. This routine immunochemical analysis of AFB₁ in peanut kernels, peanut butter and maize is a simple procedure. This enzyme immunoassay had a sensitivity for standard AFB₁ of 2 ng/ml with a working range upto 30 ng/ml and was not significantly affected by matrix interference of samples. Average recoveries of AFB₁ spiked samples at levels of 6 - 400 p.p.b were 90 - 112.5%. There was found to be high positive correlation when this assay results using laboratory prepared samples contaminated with *Aspergillus flavus* were compared with thin layer chromatography techniques. NGKR

Rapeseeds

- 562 Delisle (J), Amiot (J), Dauphin (F), Roy (A), Brisson (GJ) and Jones (JD). Nutritive value of rapeseed proteins and fractions supplemented with methionine and tyrosine in rats. *Qualitas Plantarum - Plant Foods for Human Nutrition* 37(2); 1987; 109-116

The nutritive value and digestibility of rapeseed 2S fraction could be improved by supplementation with tyrosine and by blending with fraction 12S, in proportions to those found in the rapeseed protein concn. The nutritive value and digestibility, of rapeseed protein concn. retentate, precipitate and rapeseed 12S fraction were not improved by supplementation with methionine. BV

Soybeans

- 563 Kato (T), Shiga (I) and Terasawa (K). Preservation of okara (soybean residue from soy mash) by lactic acid fermentation. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi)' 33(12); 1987; 837-841 (Ja).

Okara is a by-product of tofu manufacturing. Lactic acid bacteria was used as starter cultures to prevent microbiological deterioration of okara. Yoghurt was added to okara as starter cultures with or without 1% glucose. It was difficult to prevent the spoilage of okara in aerobic condition. But in facultatively anaerobic condition such as packing in a polyethylene film bag or a screw-cap bottle, okara was fermented by lactic acid bacteria, lowering its pH value below 4.2 resulting in inhibition of the growth of spoilage bacteria at least 4 days at 37 C. Dried starter of lactic acid bacteria, especially *Lactobacillus plantarum* was more suitable than yoghurt in respect to utility. Optimum fermentation conditions for preventing the microbiological deterioration of okara were inoculation of 10⁸ dried lactic acid bacteria/g with 1% glucose and semi-anaerobic incubation at 30-37 C. AS

- 564 Nout (MJR), de Dreu (MA), Zuurbier (AM) and Bonants-van Laarhoven (TMG). Ecology of controlled soybean acidification for tempeh manufacture. *Food Microbiology* 4(2); 1987; 165-172

This paper deals with the control of the prefermentation soaking stage of soybeans but might be applicable to fermentations of other vegetable material as well. The traditional procedure of soaking the beans in fresh water overnight at 25 - 30 C results in spontaneous fermentations. It was observed that fermentative acidification during the soak influenced the microbiological composition in later processing stages and in the final product. The findings indicated that a simple recycling process can result in predictable acidification during soaking of soybeans, contributing to the shelf life and safety of tempeh. NGKR

- 565 Pollio (ML), Resnik (SL) and Chirife (J). Water sorption isotherms of soybean varieties grown in Argentina. *International Journal of Food Science and Technology* 22(4); 1987; 335-338

This study measures water adsorption isotherms at 25 C of five var. of soybean of economical importance in Argentina, and the effect of varying oil content on them. BV

Soy products

Miso

- 566 Kitada (Y), Mizobuchi (M), Ueda (Y), Yamamoto (M), Ishikawa (M) and Kawanishi (S). Recovery of isoflavones from soybean cooking drain of a miso factory. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi)' 33(12); 1987; 821-825 (Ja).

A procedure to recover the isoflavones, such as daidzin daidzein, genistin and -genistein, from the cooking drain which was obtained in the manufacturing process of miso (fermented soy paste) from soybean, was investigated. The drain was treated with 5 kinds of adsorbent. As the result, the adsorbent of "Diaion HP-20" was most effective. After adjusting the drain to pH 4.0 with acetic acid, it was applied to HP-20 resin column chromatography. The applied resin was washed with water followed by 20% ethanol solution, and then was eluted with ethanol. By this method, the isoflavones in the 80% ethanol extract of defatted soybean flakes were purified. The isoflavones in the extract were adsorbed to the resin after diluting the concn. of ethanol to 20%, and then eluted with ethanol quantitatively. AS

- 567 Truesdell (DD), Green (NR) and Acosta (PB). Vitamin B12 activity in miso and tempeh. *Journal of Food Science* 52(2); 1987; 493-494

In this study commercially produced tempeh and miso, /soy bean fermented products were tested for vitamin B12 activity by growth response with *Lactobacillus leichmannii*. The USP microbiological assay was used to determine vitamin B12 activity and wide variation was observed in vitamin B12 activity between various products and this may be due to different conditions used or produced during fermentation. The necessity of assessing vitamin B12 pseudo form activity before these foods can be considered as a source of vitamin B12 is stressed. NGKR

Soy proteins

- 568 Kubena (KS), McLaughlin (CB) and Carson (DD). Magnesium restriction and soy protein during gestation and lactation in rats. *Nutrition Reports International* 36(2); 1987; 357-364

The objective of this study was to determine effects on pregnancy outcome, performance of pups during lactation and tissue scores of magnesium and calcium. The rats were fed diets containing 125-800 mg/kg magnesium and based upon either casein or soy conc. in a 2 x 2 design during growth and through one complete reproductive cycle. The results showed magnesium restriction affected wt. gain during growth, gestation and lactation. These results could have implications for women in their reproductive years who have less magnesium taken than recommended levels. NGKR

- 569 Ritter (MA), Morr (CV) and Thomas (RL). In vitro digestibility of phytate-reduced and phenolics-reduced soy protein isolates. *Journal of Food Science* 52(2); 1987; 325-327, 341

This study was carried out to find out the effects of removal of phytate and phenolic compounds on the in vitro digestibility of soy protein isolates and the in vitro digestibility of 7S and 11S soy pro-

tein fractions which contain significantly different phytate concn. The results revealed that phenolics reduced (PRSPI) and phytate and phenolics-reduced (PPR SPI) soy protein isolates were both slightly more digestible than control (CBPI) whereas 11S soy-protein with 0.07% phytate was slightly more digestible than 7S soy protein with 1.41% phytate. NGKR

TUBERS AND VEGETABLES

Root vegetables

Carrots

- 570 Issanchou (S) and Sauvageot (F). Effects of cooking method upon flavour of carrots and peas. *Journal of Food Science* 52(2); 1987; 495-496

The effects of every day cooking methods on the sensory characteristics of carrots and peas were investigated. Four different ways of cooking were studied on these two vegetables. The results showed that steam cooked vegetables have higher sensory characteristics like odour and flavour intensities, odour and flavor notes, sweetness etc. Larger losses in soluble solids and volatiles are said to be responsible for the above differences between vegetables which are cooked in water or in steam. NGKR

- 571 McKay (G), Murphy (WR) and Jodieri-Dabbaghzadeh (S). Fluidisation and hydraulic transport of carrot pieces. *Journal of Food Engineering* 6(5); 1987; 377-399

Tubers

Potatoes

- 572 Josephson (DB) and Lindsay (RC). c_6 -Heptenal: An influential volatile compound in boiled potato flavour. *Journal of Food Science* 52(2); 1987; 328-331

This investigation was carried to report the identification of t_2 , c_6 -non adienal and c_4 -heptenal in boiled potatoes and to correlate these observations on the formation and flavor properties of these compounds in potatoes. The headspace volatiles were analysed using Varian gas chromatograph and mass spectrometer. The results showed that c_4 -heptenal was present at 0.2 p.p.b which is about 50 times its recognition threshold and this provided a boiled potato like characteristic aroma and flavour note to the potatoes. c_4 -heptenal was formed from a double bond hydration retro-aldol degradation of t_2 , c_6 -non adienal which was also identified in boiled potatoes. But addition of c_4 -heptenal high levels to mashed potatoes and low levels to dehydrated reconstituted potatoes only increased the stale potato like flavours. NGKR

Yam

- 573 Kamenan (A), Beuchat (LR), Chinnan (MS) and Heaton (EK). Composition and physico-chemical properties of yam (*Dioscorea* species) flour prepared using different processes. *Journal of Food Processing and*

Preservation 11(4); 1987; 299-308

Studies are undertaken to compare proximate composition and physico chemical properties of yam flours prepared by five different methods. These processes were evaluated for producing flour from yam (*Dioscorea*) tubers. Drying methods varied by using air-oven, solar drier and drum drier before milling, peeling and boiling tubers. Results showed that flours from tubers produced by all methods were found to have acceptable sensory qualities. And Considering the need for human and mechanical energy requirements the flours obtained from tubers dried by solar drying or oven drying appeared to be most practical to the developing countries using the tubers as part of their human diet. NGKR

Vegetables

Jerusalem artichoke

- 574 Zawistowski (J), Weselake (RJ), Blank (G) and Murray (ED). Fractionation of Jerusalem artichoke phenolase by immobilized copper affinity chromatography. *Phytochemistry* 26(11); 1987; 2905-2907

Four fractions were obtained in phenolase from tubers of Jerusalem artichoke fractionated by metal chelate affinity chromatography using copper conjugated to imino diacetic acid Sepharose 6B. They showed various specific properties with an increase in activity of 160-fold for the first unbound enzymatic fraction eluted with glycine buffer. A pattern counting of three major groups of bands differing in relative mobilities was obtained by electrophoresis in gradient polyacrylamide gel. MVG

Leafy vegetables

Amaranthus tricolor

- 575 Elliott (DC) and Kokke (YS). Partial purification and properties of a protein kinase C type enzyme from plants. *Phytochemistry* 26(11); 1987; 2929-2935

Partial purification of protein kinase, with a dependence on micromolar concn. of free calcium was carried out from seedlings of *Amaranthus tricolor*. Gel filtration showed a molecular wt. of 77600 and SDS-phage analysis showed 84,500. Calcium regulated the interaction of the enzyme with membranes, a characteristic of animal protein kinase C phospholipid and diolein activation was dependent on phospholipid used and on both calcium, and phospholipid concn. In the absence of phospholipid K_m values for Ca^{2+} was 20-40 μM ; in the presence of phosphatidyl serine it was 5-10 μM . The K_m was reduced to < 1.5 μM in the presence of diolein and phosphatidyl serine. The best activation was obtained at 100 μM calcium with 40 $\mu g/ml$ phosphatidylserine and 8 $\mu g/ml$ diolein. The enzyme reacted with antiserum detected against the regulatory domain of bovine brain protein kinase C in an immunoblot experiment. MVG

Cabbages

- 576 Whitty (JP) and Bjeldanes (LF). The effects of dietary cabbage on xenobiotic-metabolizing enzymes and the binding of aflatoxin B₁ to

hepatic DNA in rats. *Food and Chemical Toxicology* 25(8); 1987; 581-587

The effect of dietary cabbage on the binding of aflatoxin B1 (AFB1) to hepatic DNA and on the activities of liver and intestinal microsomal and cytosolic enzymes was studied in weaning male Fischer rats. MVG

Spinach

- 577 Miller (J). Bioavailable iron in raw and cooked spinach and broccoli. *Nutrition Reports International* 36(2); 1987; 435-440

Studies are undertaken to determine the bioavailable iron in both raw and cooked spinach and broccoli in this investigation. These are normally consumed as vegetables both raw and cooked form. The results of heat processing, cooking or canning of these vegetables have shown no increase in the biological availability of iron. About 50% iron in spinach and 80% of that in broccoli was available for hemoglobin regeneration in anemic rats. It is shown that one cup of spinach provides about 1 mg and that of broccoli about 0.7 mg of available iron. NGKR

- 578 Nakabayashi (T). Influence of pH and temperature on the green colour of spinach. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi') 33(12); 1987; 835-836 (Ja).

It was well known that green colour of chlorophylls discoloured easily by acid and therefore the preservation of flesh green colour of green vegetable drinks was difficult. In order to preserve the green colour, this experiment was carried out to learn the basic data about the influences of pH and temp. on the change of chlorophylls to pheophytins by the use of freeze-dried spinach powder. Consequently it was ascertained that even at 0 C, the discolouration was considerably fast at pH below 5, but at pH over 6, chlorophylls were comparatively stable and the green colour was held for a long time at 0 C. AS

Okra

- 579 Kotzekidou (P) and Roukas (T). Fermentation characteristics of lactobacilli in okra (*Hibiscus esculentus*) juice. *Journal of Food Science* 52(2); 1987; 487-488, 490

The fermentation characteristics of homo and hetero fermentative lactobacilli have been determined in okra juice. With nine strains of homofermentative and ten strains of heterofermentative lactobacilli and one commercial culture in order to select suitable organisms for use in okra fermentation. The results showed that during 24 h fermentation one *Lactobacillus cellobiosus* strain converted 29.7% of the mucilage, utilized 85.7% of the reducing sugars and 90.3% of the sucrose decreasing the pH value to 3.65. For the same period seven other strains converted from 20.2-26.8% of the mucilage, 78-98% of reducing sugars and 75.80% of sucrose giving pH between 3.45 and 4.23. It was thus found that all strains showed considerable variation in the ability to produce lactic acid, acetic acid and alcohol and they all possessed low levels of lactate dehydrogenase activity. NGKR

Tomatoes

- 580 Tanglertpaibul (T) and Rao (MA). Flow properties of tomato concentrates: Effect of serum viscosity and pulp content. *Journal of Food Science* 52(2); 1987; 318-321

FRUITS

- 581 Barmore (CR). Packing technology for fresh and minimally processed fruits and vegetables. *Journal of Food Quality* 10(3); 1987; 207-217

This review describes packaging technology for fresh and minimally processed fruits and vegetables. It covers various aspects of plastic packaging materials packaging concepts like individual film wrapping, ripening, colour, physiological disorders, decay, shelf life, commercialisation, modified atm. packaging, value added products, market considerations for new packaging concepts. NGKR

- 582 Brackett (RE). Microbiological consequences of minimally processed fruits and vegetables. *Journal of Food Quality* 10(3); 1987; 195-206

This review discusses some of the ways that microbiology is affected during the handling and marketing of semi processed produce of fruits and vegetables. It covers microbiological consequences, storage conditions like temp., humidity, atm. packaging, irradiation, expected shelflife, safety aspects, spoilage aspects etc. NGKR

- 583 Klein (BP). Nutritional consequences of minimal processing of fruits and vegetables. *Journal of Food Quality* 10(3); 1987; 179-193

This review covers the various aspects of nutritional consequences of minimal processing of fruits and vegetables. The aspects covered are vitamin stability, minimal processing, handling techniques, controlled atm. storage, transport, maturity and cultivar effects, preparation practices and irradiation. NGKR

- 584 Lustig (I) and Bernstein (Z). An improved firmness tester for juicy fruit. *HortScience* 22(4); 1987; 653-655

An improved hydrostatic measuring head for firmness tester for juicy fruit is described. The firmness tester for juicy fruit measures firmness by the compression of the fruit between two parallel surfaces with a measured force until a given appplanation area is reached. BV

- 585 Rolle (RS) and Chism (GWIII). Physiological consequences of minimally processed fruits and vegetables. *Journal of Food Quality* 10(3); 1987; 157-177

This review describes the physiological consequences of minimally processed fruits and vegetables. Covers the consequences of environmental factors used to control respiration, controlled atm. storage, consequences of mechanical injury and consequences related to calcium NGKR

- 586 ✓ Shewfelt (RL). Quality of minimally processed fruits and vegetables. *Journal of Food Quality* 10(3); 1987; 143-156

In this review various aspects of physiological, nutritional and microbiological consequences of minimal processing and packaging technology of fruits and vegetables have been described. This covers quality factors, quality measurements, shelf life, quality assurance etc. NGKR

Apples

- 587 Moulding (P), Grant (HF), McLellan (KM) and Robinson (DS). Heat stability of soluble and ionically bound peroxidases extracted from apples. *International Journal of Food Science and Technology* 22(4); 1987; 391-397

Soluble and ionically bound peroxidases were extracted from apple peel and apple pulp, and activities were measured.

Apricots

- 588 Abdelhag (EH) and Labuza (TP). Air drying characteristics of apricots. *Journal of Food Science* 52(2); 1987; 342-345, 360

This study was carried out to find out the effect of pretreatment method and drying temp. on the quality of dried apricots in respect to colour and texture and to determine the treatment which has min. effect on the quality of the dried product. The four treatments followed for drying of apricots were 1) Blanching and drying 2) Sulphiting-blanching and drying 3) Blanching sulphiting and drying 4) Sulphiting and drying to 50% moisture blanching and complete drying. The sulphur dioxide levels used were 0-2000 p.p.m and drying temp. used was 50 - 80 C. The quality of dried apricots was judged by hardness and browning development. The results showed that the optimum drying temp. was 50-80 C and sulphiting drying using 800-1000 p.p.m sulphur dioxide was found to be the best treatment. It was also found that drying at 80 C reduced the time by 50% as compared to drying at 50 C and blanching also reduced the time by 10-20% and sulphur dioxide loss was more than 50% in all 4 treatments. NGKR

Blueberries

- 589 Yang (CST) and Yang (PPA). Effect of pH, certain chemicals and holding time-temperature on the colour of low bush blueberry puree. *Journal of Food Science* 52(2); 1987; 346-347

This study involves storage changes in the colour of low bush blue berry puree due to the effect of pH, chemicals and holding time-temp. at 50 C and -20 C. The results revealed that the puree became darker as pH shifted from low to high whereas chemicals like EDTA and aluminium trichloride produce a redder and yellower puree and tin dichloride and tin tetra chloride bluish purple. It has also been found that the combining effect of pH and chemicals showed a stabilising effect on puree colour irrespective of holding time-temp. The colour values are preferred to be used instead of absorbance ratios A510/A410. NGKR

Grapes

- 590 Lamikanra (O). The proteins of muscadine grapes. *Journal of Food Science* 52(2); 1987; 483-484

The muscadine grape proteins were separated and characterised based on their mol. wt. and isoelectric point. The results of analysis of the concn. mol. wt. and isoelectric points of proteins present in these grapes showed that the total protein contents of these grapes are found to be consistent with values reported in literature for *V. vinefera* grape proteins. However mol. wt. of most of the protein fractions were found to be relatively high when compared with those of other grape cv. whereas isoelectric points of muscadine proteins ranged between pH 5.6 and 7.6. NGKR

Mangoes

- 591 Bartley (JP) and Schwede (A). Volatile flavour components in the headspace of the Australian or "Bowen" mango. *Journal of Food Science* 52(2); 1987; 353-355, 360

This investigation was carried out to identify the chemical components responsible for the unique flavour of the "Bowen" mango and to compare its flavour profile with those of other var. reported in the literature. These volatile constituents have been isolated by concn. of the headspace vapors on GC and the results revealed presence of ethyl butonate and terpinolene although a number of other esters and terpenes are present in very small amounts. It was also found that with ripening of the mango fruit during storage the ethyl butonate concn. decreased accompanied by an increase in concn. of higher esters. NGKR

Oranges

- 592 O'Mahony (M) and Goldstein (LR). Sensory techniques for measuring differences in California Navel oranges treated with doses of gamma-radiation below 0.6 Kg ray. *Journal of Food Science* 52(2); 1987; 348-352

This investigation was carried out to measure the sensory effects of irradiation on oranges and to determine whether doses as low as 0.3 KGy (30 Krad) which can sterilise insect pests had less of a sensory impact than higher doses designed to kill. Navel oranges from California were given low post harvest doses of gamma radiation: 0.32-0.37 and 0.52-0.60 KGy (32-37 and 52-60 Krad). These were compared with non irradiated controls for visual appearance, flavour by mouth, odour, taste and taste after sweetness suppression by *Gynema sylvestre*. The sensory evaluation by practiced judges showed no differences in appearance, flavour, taste and odour although they were found to be less extreme at the lower dose. Only at the higher irradiation level the juices could be discriminated by untrained judges. NGKR

Papayas

- 593 Forbus (WRJr), Senter (SD) and Chan (HTJr). Measurement of papaya maturity by delayed light emission. *Journal of Food Science* 52(2); 1987; 356-360

The objective was to find change in the physical and chemical properties of papaya during maturation on the intensity of the delayed light emission (DLE) they produce and to determine the feasibility for sorting papayas into categories of maturity by DLE. Results of evaluation for differences in intensity of DLE, chlorophyll, Beta-carotene and colour values showed high correlations between DLE intensity and chemical/physical properties that are related to papaya maturity. DLE has been found a high potential as a rapid screening technique for identifying papayas which are one half ripe and riper. NGKR

Peaches

- 594 Shewfelt (RL), Meyers (SC), Prussia (SE) and Jordan (JL). Quality of fresh-market peaches within the postharvest handling system. *Journal of Food Science* 52(2); 1987; 361-364

In this study the effects of physiological maturity at harvest on quality changes in peaches during post harvest handling, to develop a fresh market peach handling system and to find out the factors in the system that control the quality at the purchase point. Samples of peaches collected at various points in the postharvest handling system were evaluated for maturity, colour, firmness, soluble solids and total acidity. Ripening temp. and harvesting maturity were found to control the quality of peaches in addition to the firmness. Ripening at (18-24 C) at the retail outlet or in the home just before consumption seem to improve the peach quality maintaining proper handling system to control harvest maturity. NGKR

Pears

- 595 Merin (U), Gagel (S), Popel (G), Bernstein (S) and Rosenthal (I). Thermal degradation kinetics of prickly-pear-fruit red pigment. *Journal of Food Science* 52(2); 1987; 485-486

The kinetics and stability of a red pigment obtained from prickly pear for its potential use as a natural food colorant was evaluated. The colour stability of beta cyanine from prickly pear was determined in the fruit juice at temp. upto 90 C. The results showed that the degradation rates were found to be dependent on pigment concn. and found to be slower for higher concn. The lack of a significant oxygen effect or inhibitory action of ascorbic acid did not support autooxidation as the exclusive chemical process responsible for decolorization. NGKR

Pineapples

- 596 Tisseau (R). Utilization of pineapple canning waste. Feasibility of bromeline extraction. *Fruits* 41(12); 1986; 703-708 (Fr)

CONFECTIONERY, STARCH AND SUGAR

Saccharides

- 597 Mauch (W), Gennrich (A) and Molnar (I). The separation of saccharides by means of a gradient elution. *Zeitschrift für Lebensmittel-*

Untersuchung und -Forschung 185(5); 1987; 383-385 (De).

A gradient system is developed for qualitative and quantitative detn. of saccharides (within the range from monosaccharides to oligosaccharides) which permits the separation and subsequent detection of saccharides (DP=1M to DP=6) by using differential refractometer. BV

Sugar

Sucrose

- 598 Hsieh (YP) and Harris (ND). Copper activity in sucrose solutions. Journal of Food Science 52(2); 1987; 498-499

BAKERY PRODUCTS

Biscuits

- 599 Gormley (TR). Fracture testing of cream cracker biscuits. Journal of Food Engineering 6(5); 1987; 325-332

The results on experiments on a modified shear press fitted with a 70 X 3 mm perspex blade for measuring the resistance to fracture of cream cracker biscuits showed satisfactory performance. Tests on five commercial cream cracker brands showed statistically significant different resistance to fracture between the brands and some packs also showed high within pack variation in fracture resistance. It was also seen that over baked cream crackers were found to be more resistant to fracture than underbaked ones. NGKR

MILK AND DAIRY PRODUCTS

- 600 Bradshaw (JG), Peeler (JT), Corwin (JJ), Hunt (JM) and Twedt (RM). Thermal resistance of *Listeria monocytogenes* in dairy products. Journal of Food Protection 50(7); 1987; 543-544

Listeria monocytogenes strain Scott A associated with a recent milk borne outbreak of listeriosis was determined in whole milk, skim milk, heavy cream and ice cream mix. The organism suspended at concn. of approximately 1×10^5 cells/ml was heated from 52.2 to 79.4 °C at various contact times. For milk samples the $D_{71.7}^{\circ C}$ values ranged from 0.9 to 2.7 s, for ice cream mix the $D_{79.4}^{\circ C}$ value was 0.5 s. For fluid products the Z_D values ranged from 5.8 to 7.1 °C; the Z_F value for ice cream mix was 7.0 °C. The suspension of the organism would not survive a proper pasteurization process given to raw dairy products. MVG

- 601 Phillips (JD) and Griffiths (MW). The relation between temperature and growth of bacteria in dairy products. Food Microbiology 4(2); 1987; 173-185

The effect of temp. on the growth of psychrotrophs in dairy products has been studied using the 'square root' and Arrhenius models. The square root model has been shown to accurately predict temp.

effects on the growth of several psychrotrophs in a number of dairy products. The formula can be applied for individual bacteria regardless of growth medium. This was not true for the Arrhenius equation. In this case, the apparent activation energy for growth (u) was dependent on source of isolate and growth medium. For isolates from pasteurized cream, u values were lower during growth in double cream than those obtained during growth in full-fat milk. This was due to shorter generation times at lower temp. when these isolates were grown in double cream. Temp. growth parameters were similar for bacteria grown in pasteurized as well UHT products. AS

- 602 Schmidt (DG) and Both (P). Studies on the precipitation of calcium phosphate I: Experiments in the pH range 5.3 to 6.8 at 25 C and 50 C in the absence of additives. *Netherlands Milk and Dairy Journal* 41(2); 1987; 105-120

- 603 Schmidt (DG), Both (P), Visser (S), Slangen (KJ) and van Rooijen (PJ). Studies on the precipitation of calcium phosphate. II. Experiments in the pH range 7.3 to 5.8 at 25 and 50 C in the presence of additives. *Netherlands Milk and Dairy Journal* 41(2); 1987; 121-136

The influence of a number of preparations, largely isolated from milk, on the precipitation of calcium phosphate from supersaturated solutions has been studied at 25 C. Whole casein, phosphopeptides from casein, and several whey preparations, either from cheese whey or from acid whey, showed a strong inhibition of the calcium phosphate precipitation. Bovine serum albumin, Beta-lactoglobulin and κ -casein macropeptide had no effect. Whole casein and the acid whey preparation (AWP) were further studied at 25 C and 50 C in the pH range 7.3 to 5.8. At 25 C inhibition was strongest at pH 6.7, whereas at 50 C the inhibitory effect increased with decreasing pH. In all cases AWP was much more effective than whole casein. The precipitating calcium phosphate phase was not affected by the presence of the inhibitors. The active component present in AWP has been identified as the peptide fragment 1-105 of Beta-casein. The inhibitory effect probably arises from adsorption of the inhibitor molecules, via their phosphoserine residues, to the surface of the calcium phosphate nuclei thus preventing further growth. AS

- 604 Smith (KE) and Bradley (RL Jr). Efficacy of sanitizers using unsoiled spiral-wound polysulfone ultrafiltration membranes. *Journal of Food Protection* 50(7); 1987; 567-572

Considerable difficulty is encountered in removing soil from UF system in dairy industry because sanitizers are not effective in the presence of soil and it was not possible to gather any information on the efficacy of different sanitizers in the UF system. MVG

Milk

- 605 Bruno de Cindio), Grasso (G) and Karasoy (Z). Check of milk coagulation process using thermal conductivity measures (hot wire method) 2nd. *Industria Alimentari* 26(5); 1987; 449-456 (It).
- 606 Casey (D), O'Callaghan (DJ), Palmer (J) and Howett (D). Continuous measurement of stack losses from a skimmed milk drying plant. *Journal of the Society of Dairy Technology* 40(2); 1987; 34-37

The results from the Quaestor Dust Monitor with standard method isokinetic sampling were studied. Result obtained was applied to observe stack losses during process operation. MVG

- 607 Grisius (R), Wells (JH), Barrett (EL) and Singh (RP). Correlation of time-temperature indicator response with microbial growth in pasteurized milk. *Journal of Food Processing and Preservation* 11(4); 1987; 309-324

Studies were undertaken to correlate the microbial growth in pasteurised whole milk stored at refrigerated temp. with the time-temp. indicators which are commercially available. Commercially obtained pasteurised whole milk was stored at three constant temp. (0, 5 and 10 C) and one variable temp. condition (cyclic exposure of 0 for 14 days and 10 C for 2 days). Daily analyses were conducted to enumerate the growth of total bacteria coliforms, psychrotrophs and spore forming organisms in samples from each storage treatment. Results showed significant correlations between total count enumeration and the lifeline model 57 indicator. NGKR

- 608 Jeffrey (DC) and Wilson (J). Effect of mastitis-related bacteria on total bacterial count of bulk milk supplies. *Journal of the Society of Dairy Technology* 40(2); 1987; 23-26

- 609 Kneifel (W), Foissy (H) and Goller (H). Comparison of the An Bord Baine method, the Australian standard method and an automatic procedure for determining the heat-coagulation time of 20% reconstituted milk. *Journal of the Society of Dairy Technology* 40(2); 1987; 42-45

Results of the two most common detn. methods of the coagulation time of 20% skimmed milk powder i.e. Irish An Bord Baine method (similar to Davies & White method) and the Australian standard method with the automatic procedure and to establish correlation between the tests has been studied. Significant correlations were observed between the An Bord Baine and Australian standard methods. MVG

- 610 Knight (AH), Shapton (N) and Prentice (GA). Collaborative trial of the penzym assay: A rapid method for the detection of Beta-lactam antibiotics in milk. *Journal of the Society of Dairy Technology* 40(2); 1987; 30-33

Penzym assay was evaluated in detecting Beta-lactam antibiotics in milk, in a collaborative trial involving 11 laboratories, seven on production sites, and three in R&D institution and one in the premises of the supplier of the test kits. MVG

- 611 Koops (J), Klomp (H) and Kerkhof Mogot (MF). Iodine in Dutch milk: Determination by cathodic-scan differential-pulse polarography after ashing. *Netherlands Milk and Dairy Journal* 41(2); 1987; 161-173

In the present paper details are given of a polarographic method of determining iodine in milk. The crucial ashing step in the procedure was evaluated by estimating the recovery of metabolized I after ashing. The method gives accurate results, as appears from the analysis of three skim milk powders, certified for iodine (reference materials). Some data of the actual iodine content of dutch milk are given. The average values of 49 and 16 ug I/kg for milk from the winter and summer period resp., confirm earlier observations. AS

- 612 Morr (CV). Effect of HTST pasteurization of milk, cheese whey and cheese whey UF retentate upon the composition, physicochemical and functional properties of whey protein concentrates. *Journal of Food Science* 52(2); 1987; 312-317

This investigation has been carried out to compare the effects of high temp. short time pasteurisation of milk cheddar cheese whey and UF retentate from cheddar cheese whey upon the compositional, physicochemical and functional properties of whey protein concn. (WPC). It was found that HTST pasteurisation of milk (72 C - 15 Sec.), whey and UF retentate caused no significant differences in chemical composition of resulting WPCs and its solubility whereas heating UF retentate caused significant loss of WPC solubility. HTST pasteurisation of milk caused a significant lowering of max. foam expansion of WPC dispersions but for whey and UF retentate no significant effect was observed. NGKR

- 613 Mottar (J). A colorimetric endotoxin assay for the determination of the bacteriological quality of milk. *Netherlands Milk and Dairy Journal* 41(2); 1987; 137-145

A rapid colorimetric method for the detn. of endotoxins in milk is proposed and its value for bacteriological quality control is investigated. The colorimetric endotoxin method permits rapid and accurate estimation of the gram-negative bacterial count in raw milk (S_m less than or equal to 0.08 log units; $S_{y,x} = 0.29$ log plate count units). The method is also useful for a rough estimation of the total bacterial count in deep cooled raw milk ($S_{y,x} = 0.04$ log plate count units), which allows rapid selection of raw materials. An evaluation of the bacteriological quality of the raw material used in heat-treated milk is also possible, provided that the precise effect of the heat treatment on the release of endotoxins is known. BV

- 614 Tibana (A), Warnken (MB), Nunes (MP), Ricciardi (ID) and Noleto (ALS). Occurrence of *Yersinia* species in raw and pasteurized milk in Rio de Janeiro, Brazil. *Journal of Food Protection* 50(7); 1987; 580-583
- 615 Wilson (J) and Jeffrey (DC). A selective medium for mastitis streptococci in milk. *Journal of the Society of Dairy Technology* 40(2); 1987; 27-29

Since the introduction by Milk Marketing Boards throughout the UK of automated systems which enable total bacterial counts to be carried out economically and at frequent intervals on bulk milk consignments, streptococci associated with subclinical mastitis are more readily detected. In many cases the presence of these organisms has resulted in heavy financial penalties being imposed. An improved selective medium which could assist in the rapid detection of such cases and allow prompt remedial action to be taken. AS

Milk products

Cheese

- 616 Exterkate (FA). On the possibility of accelerating the ripening of Gouda cheese. *Netherlands Milk and Dairy Journal* 41(2); 1987; 189-194

- 617 Iyer (M) and Lelievre (J). Yield of cheddar cheese manufactured from milk concentrated by ultrafiltration. *Journal of the Society of Dairy Technology* 40(2); 1987; 45-50

Methods by which ultrafiltration(UF) can increase cheese yields has been studied. Results indicate potential yield with UF cheese making resulting decreases in fat and insoluble casein during conventional cheese manufacture. MVG

- 618 Kirby (CJ), Brooker (BE) and Law (BA). Accelerated ripening of cheese using liposome-encapsulated enzyme. *International Journal of Food Science and Technology* 22(4); 1987; 355-375

Improved efficiency of liposome encapsulation of a cheese-ripening enzyme and increased retention of encapsulated enzyme by cheese curd are reported. The economy of enzyme usage for accelerating the rate of ripening of Cheddar cheese has been improved about 100-fold over previously reported methods. This has made feasible the use of microencapsulated enzymes for large-scale cheese production. Objective measurement of cheese ripening by proteolytic indices, and subjective evaluation of flavour quality and intensity by trained taste panels, indicate that cheeses are ripened by the microencapsulated enzyme in half the normal time. Investigations aimed at further improving the efficiency and commercial feasibility of the process are reported, and the possibility of using this technology for other aspects of food processing are discussed. AS

- 619 Laleye (LC), Simard (RE), Gosselin (C), Lee (BH) and Giroux (RN). Assessment of cheddar cheese quality by chromatographic analysis of free amino acids biogenic amines. *Journal of Food Science* 52(2); 1987; 303-307, 311

This investigation was done to apply recent methods to the analysis of free amino acids extracted from high quality cheddar cheeses and late-gassing cheddar cheeses and the method of trifluoroacetylation was developed to quantify biogenic amines on a microgram scale. In this connection the free amino acids and biogenic amines extracted from normal and late-gassing cheddar cheese were reacted with heptafluorobutyric anhydride and trifluoroacetic anhydride resp. before quantification by GLC. The results of analysis revealed twenty amino acids in both types of cheese but only high levels of Gamma-amino acid butyrate (0.3 to 19.4 mg/g) and small quantities of arginate were found to be associated with poorly aged cheddar cheeses. Histamine and tyramine were the bioamines present in highest concn. in both types of cheeses. NGKR

- 620 Luna (JA) and Bressan (JA). Mass transfer during ripening of Cuartirolo Argentino cheese. *Journal of Food Science* 52(2); 1987; 308-311

The mass transfer during ripening of Argentino cheese was mathematically modelled as an effective diffusion process. The evolution with the time of NaCl concn. profiles in the entire mass of cheese can be accurately predicted with the proposed mathematical model. The equation was found to allow the calculation of the equilibrium salt concn. from different brining times. NGKR

Kasar cheese

- 621 Aran (N) and Eke (D). Mould mycoflora of Kasar cheese at the stage of consumption. *Food Microbiology* 4(2); 1987; 101-104

This investigation was carried out to estimate the level of mould contamination and to find out the mould mycoflora of Turkish Kasar cheese. The 88 samples of cheese from retail market in Turkey and also 30 samples of cheese from cold store houses (5 months old) were obtained and mycological analyses have been made to determine the level of contamination and to identify the moulds. The results showed that mould counts have been found to be more than $4 \cdot 10^3$ cfu/g for the market samples and above $5 \cdot 10^3$ cfu/g for the storage room samples. It was observed that 90-93% of the moulds isolated from the samples consisted of penicillia and among the mycoflora percentage of *P. ver. var cyclopium* varied from 45 to 48%. Evaluation to see which mycotoxins could be produced by the species most frequently isolated has been made the above results. NGKR

Ice cream

- 622 Wilbey (RA). The manufacture of dairy ice cream. *IFST Proceedings* 19(2); 1986; 85-88

Milk powders

- 623 Lammers (WL), van der Stege (HJ) and Walstra (P). Determination of the particle size distribution of non-agglomerated milk powders. *Netherlands Milk and Dairy Journal* 41(2); 1987; 147-160

The particle size distribution of various milk powders of different vacuole content and particle shape was studied; none of those powders was deliberately agglomerated. Particles smaller than $10 \mu m$ should be disregarded. Sieving, sedimentation analysis and permeametry were considered unreliable. Microscopy of specimens dispersed in paraffin oil is suitable, but is tedious and time-consuming and not very reproducible. Photomicrography gives unreliable results. Coulter counting is more convenient and quicker than microscopy but does not give significantly better reproducibility; as a diluent isopropanol with ammonium thiocyanate is suitable. Fraunhofer diffraction analysis (Malvern particle size) was not reliable if the powder was dispersed in organic solvents, but dispersion in air gave reasonable results; the reproducibility was fairly good. For many powders, the three methods gave rather different results. This is because they sense different attributes; the Coulter counter net particle volume, the Malvern projected area and the microscope something between the largest and the average diameter of each particle. Moreover, presence of vacuoles (and whether they are open or not) and the state of agglomeration have different effects in the various methods. A largely qualitative interpretation of the differences in results is given. AS

Milk proteins

Casein

- 624 Kanazawa (K), Ashida (H) and Natake (M). Autoxidizing process interaction of linoleic acid with casein. *Journal of Food Science* 52(2); 1987; 475-478

The effects of linoleic acid (LA) its hydroperoxide (LAHPO) and its secondary autooxidation products (SP) and the interactions of these products with casein have been investigated in these studies. It was found that casein did not permit autooxidation of LA but it subsequently was found to become undigestible during 1 day incubation with SP or after 2 days with LAH PO whereas after 4 days or more it was found to cause casein to be deprived of its amino acids and cause polymerisation. NGKR

- 625 Karman (AH), van Boekel (MAJS) and Arentsen-Stasse (AP). A simple and rapid method to determine the casein content of milk by infrared spectrophotometry. *Netherlands Milk and Dairy Journal* 41(2); 1987; 175-187

In principle, the protein content of milk and of the rennet whey made from that milk is determined by the instrument; after applying two corrections, the (para) casein content is calculated from the difference between the two readings. One correction is necessary because the apparatus is calibrated on the crude protein content of milk so that the protein readings on rennet wheys do not correspond exactly with the Kjeldahl results. The correction is necessary to compensate for the volume occupied by fat and casein. Both corrections are accounted for by a simple formula. The (para)casein content could thus be determined in a simple and rapid way (the procedure takes about one h). With regard to precision and accuracy the method is considered adequate; no systematic difference is found between this and the standard Kjeldahl method; the variation coefficient is estimated at 1.5%. With bulk milks the results are expected to be even better. Since the method determines in fact paracasein, the relation between casein and paracasein was established. It appeared that the proteose peptone content of milk serum was some 20% higher than that of rennet whey. AS

MEAT AND POULTRY

Meat

- 626 Di Sipio (F) and Trulli (G). Animal kinds determination in meat mixture using radial immunodiffusion method. *Industrie Alimentari* 26(5), 1987; 457-460 (It).

Protein extracts are prepared by meat maceration in 0.15 M NaCl (1g/l di sodio azide)-to-dry residue constant ratio and analyzed using antialbumen specific sera. The precipitation area concn. correlation are estimated by statistical coefficient "r". AS

- 627 Kafel (S) and Pogorzelska (E). Transfer volume-dependent recovery of *Salmonella* from minced meat. *Journal of Food Protection* 50(7); 1987;

584-586

The interplay between inoculation of enrichment broths with diluted suspension of preenrichment culture and detection of *Salmonella* in frozen minced meat has been elucidated. MVG

- 628 Krautil (FL) and Tulloch (JD). Microbiology of mechanically recovered meat. *Journal of Food Protection* 50(7); 1987; 557-561

This survey tries to establish the bacterial levels in mechanically recovered meat (MRM) in Victoria and to determine whether the product poses a public health risk. Samples taken from 11 machines operated by 8 individual companies were subjected to bacterial analysis. Quality of MRM varied between plants, with only their plants able to consistently produce good quality MRM. The best product was produced at plants which boned out on the premises, held bones at less than 10 °C and produced them within 8 h. MVG

- 629 Lin (CS) and Zayas (JF). Microstructural comparisons of meat emulsions prepared with corn protein emulsified and unemulsified fat. *Journal of Food Science* 52(2); 1987; 267-270

This investigation was carried out to study the influence of the utilisation of corn germ protein as powder and stabiliser in pre emulsified fat on the micro structure of comminuted meat products. The results showed that the addition of corn germ protein to the sausage formulation had a specific effect on the formation of the structure of comminuted meat products. The fat globule stabilisation by formation of protein film on the surface of small fat droplets can be increased by this additive which will also prevent coalescence of large fat globules during heat treatment. Preemulsified fat applied in the comminuted meat products is found to increase the fat content as well as its uniform distribution. NGKR

- 630 Malisch (R). Method for the simultaneous determination of residues of chemotherapeutics, antiparasitics, and growth promoters in foodstuffs of animal origin. Part III. Determination of chloramphenicol and meticlorpindol. *Zeitschrift für Lebensmittel-Untersuchung und -Forschung* 184(6); 1987; 467-477

Chloramphenicol and meticlorpindol may be determined by HPLC with UV-detection with a limit of 0.02-0.03 mg/kg. Residues of 0.001 mg/kg chloramphenicol are determined by capillary-GC with an ECD after an additional clean up step using chromatography on a miniaturized silica column, followed by a silylation step.

- 631 Parks (LL) and Carpenter (JA). Functionality of six nonmeat proteins in meat emulsion systems. *Journal of Food Science* 52(2); 1987; 271-274, 278

In this study the functional estimates of emulsion stabilisation by six non meat proteins namely soy protein isolate, soy protein conc, soy flour, milk protein hydrolysate, autolysed yeast and spray dried nonfat dry milk have been developed to determine their textural effects and to compare the methodology of monitoring emulsion stability. The results revealed that soy protein isolate, and non fat dry milk were found to be most effective whereas soy flour and autolyzed yeast were least effective in emulsion stabilization. The bind value

constants were also developed for each non meat protein. It is reported that the mean compression values for all the non meat proteins except soy protein isolate decreased with increasing levels of the additives. These are found to be specific for the non meat proteins and will not apply to other non meat proteins of a similar type. NGKR

- 632 Warnken (MB), Nunes (MP) and Noleto (ALS). Incidence of *Yersinia* species in meat samples purchased in Rio de Janeiro, Brazil. *Journal of Food Protection* 50(7); 1987; 578-579, 583

Beef

- 633 Anderson (ME), Huff (HE), Naumann (HD), Marshall (RT), Damare (JM), Pratt (M) and Johnston (R). Evaluation of an automated beef carcass washing and sanitizing system under production conditions. *Journal of Food Protection* 50(7); 1987; 562-566
- 634 Griffin (DB), Keeton (JT), Savell (JW), Leu (R), Vanderzant (C) and Cross (HR). Physical and sensory characteristics of vacuum packaged beef steaks and roasts treated with an edible acetylated monoglyceride. *Journal of Food Protection* 50(7); 1987; 550-553

The effects of acetylated monoglyceride as a protective on stored vacuum packaged lamb and beef cuts were studied. Mean lean colour, surface discolouration and overall appearance were not consistently differentiated. From control steaks and roasts regardless of storage time, no significant differences were observed in pH values of the lean and purge, percentage moisture or sensory evaluation of treated steaks and roasts before storage. MVG

- 635 Huffman (DL), Ande (CF), Cordray (JC), Stanley (MH) and Egbert (WR). Influence of polyphosphate on storage stability of restructured beef and pork nuggets. *Journal of Food Science* 52(2); 1987; 275-278

This investigation was carried out to determine the effects of alkaline polyphosphate on sensory characteristics and lipid oxidation in restructured battered and breaded and pre cooked beef and pork nuggets. The results showed that polyphosphate addition to restructured, cooked beef and pork nuggets had no effect on the total or expressible moisture in these experiments. It is also seen that the protective action of polyphosphates may protect the flavour of similar beef products if stored frozen for longer periods of time. NGKR

- 636 Kotula (AW), Emswiler-Rose (BS) and Cramer (DV). Subacute study of rats fed ground beef treated with aqueous chlorine - Anatomic pathology. *Journal of Food Protection* 50(7); 1987; 573-577
- 637 Larick (DK), Hedrick (HB), Bailey (ME), Williams (JE), Hancock (DL), Garner (GB) and Morrow (RE). Flavour constituents of beef as influenced by forage-and grain-feeding. *Journal of Food Science* 52(2); 1987; 245-251

This study was carried to identify and quantify the volatile flavour constituents present in beef fat from the animals fed forage and grain diets and also to determine the relationship between these constituents and sensory characteristics of the cooked meat. In addition to this the characteristics of the carcass and muscle tenderness

of these animals were determined. The results showed when Hereford yearling steers were allotted to one of three pasture systems viz. tall fescue, smooth brome grass red clover or orchard grass red clover, the steers were serially slaughtered at 0, 56, 84 and 112 days. The carcass quality grades and yield grade numbers increased when steers were fed grain upto 112 days. The tenderness of loin steaks increased upto 84 days and sensory characteristics for grassy flavour of steaks and ground beef decreased upto 112 days. 53 compounds were identified in the volatiles of melted subcutaneous fat by direct sampling GLC/MS. The major differences found between volatiles from fat of forage fed compared to grain fed steers were the higher concn. of 2, 3-octanedione and various diterpenoids present in the samples of forage fed animals. NGKR

- 638 Leu (R), Keeton (JT), Griffin (DB), Savell (JW) and Vanderzant (C). Microflora of vacuum packaged beef steaks and roasts treated with an edible acetylated monoglyceride. *Journal of Food Protection* 50(7); 1987; 554-556

- 639 Means (WJ), Clarke (AD), Sofos (JN) and Schmidt (GR). Binding, sensory and storage properties of algin/calcium structured beef steaks. *Journal of Food Science* 52(2); 1987; 252-256, 262

This study reports the effectiveness of the algin/calcium gelation mechanism as a binding agent in raw and cooked structured beef steaks made with and without addition of glucono-delta-lactone. The sensory evaluation and their shelf life when refrigerated under aerobic or anaerobic conditions have been investigated along with 100% beef controls and with structured steaks formed with salt and phosphate. The results showed that the algin/calcium gel mechanism can be used to produce structured beef steaks under simulated commercial conditions. These products were found to possess adequate binding characteristics in both the raw, refrigerated state and cooked state. However vacuum packaging does not give protection during storage. This new technology offers scope for development of new meat products in fresh state with increased consumer appeal and marketing alternatives. NGKR

- 640 Ramirez (MA) and Spillman (DM). A rapid method for the determination of thiobarbituric acid reactive substances. *Journal of Food Science* 52(2); 1987; 500, 502

A method for the detn. of thiobarbituric acid reactive substances has been developed. This has been found to reduce the time required by use of an autoclave for a short time instead of conventional heating methods. In this method even small samples are enough. No statistical differences were seen between ground beef and standards using the conventional and new method. NGKR

- 641 Townsend (WE) and Blankenship (LC). Enzyme profile of raw and heat-processed beef, pork and turkey using the "Apizym" system. *Journal of Food Science* 52(2); 1987; 511-512

- 642 Zamora (MC) and Zaritzky (NE). Potassium sorbate inhibition of microorganisms growing on refrigerated packaged beef. *Journal of Food Science* 52(2); 1987; 257-262

This study was undertaken to evaluate the effectiveness of

potassium sorbate solutions on refrigerated beef to enhance its shelf life and to assess the influence of the preservative concn., storage temp., pH of the meat and gas permeability of the wrapping film on each of the microorganisms which are found in the natural flora of the product. The influence of potassium sorbate concn. of 27-1325 p.p.m of sorbic acid on the growth of natural flora in raw beef samples wrapped in plastic films of different oxygen permeability was studied at 0 and 4 C in this investigation. The changes in aerobic plate counts *Pseudomonas* spp., *Brochothrix thermosphacta*, *Lactobacillus* spp., *Enterobacteriaceae* and yeasts were monitored. The antimicrobial action was evaluated by the Inhibition Index and it is observed that a significant increase in the time to reach aerobic counts of 10 CFU/cm at low storage temp. pH values occurred in vacuum packaged treated samples. NGKR

Mutton

- 43 Prasad (VSS), Field (RA), Miller (GJ), Williams (JC) and Riley (ML). Restructured mutton roast quality. *Journal of Food Science* 53(2); 1987; 282-285

This study was carried out to investigate the influence of monosodium glutamate (MSG) and various levels of lamb on objective and subjective characteristics of restructured mutton roasts and determine the pyridinoline content of collagen from lambs and mutton. The results showed that the physical effects due to the addition of MSG and the interaction between MSG and lamb level were not significant. The characteristics of restructured mutton and lamb roasts made with MSG (0.2%) were found to be not distinguishable from control roasts. It is also found that as 100% lamb roasts and roasts with increased proportions of lamb had better bind than 100% mutton roasts. It is suggested that quantity of salt-extracted myofibrillar proteins could be different in lamb and mutton. It is found that mutton used in product manufacture had more collagen and pyridinoline than lamb. NGKR

Pork

- 644 Jones (SL), Carr (TR) and McKeith (FK). Palatability and storage characteristics of precooked pork roasts. *Journal of Food Science* 52(2); 1987; 279-281, 285

This study was undertaken to evaluate cook-in-the-bag processing and the effect of tripolyphosphates on sensory properties and shelf life of fresh-frozen and precooked pork roasts for consumer use. The results showed that precooking pork roasts provides consumers with a fast easy way to prepare pork product with tenderness, juiciness and flavour properties similar to those of a conventional, oven prepared, pork roast, precooking pork roasts in a vacuum. Cooking bag limited microbial growth and it appears that these products would have a shelf life in excess of 28 days of refrigerated storage. NGKR

- 645 Molins (RA), Kraft (AA) and Marcy (JA). Extension of the shelflife of fresh ground pork with polyphosphates. *Journal of Food Science* 52(2); 1987; 513-514

The antimicrobial effects of 1% sodium acid pyrophosphate and sodium ortho phosphate monobasic alone or combined were studied in

fresh ground pork held at 2-4 C for 6 days. It was found that by addition of 1% SAPP to the meat prevented bacterial growth and increased the meat shelf life by 50% as compared to control samples and meat treated with 0.5% or 1% orthophosphate. Addition of these two compounds was less effective than SAPP alone. The inhibition of bacteria is not found to be proportional to the soluble orthophosphate content in ground pork. NGKR

Meat products

Ham

- 646 Leak (FW), Kemp (JD), Fox (JD) and Langlois (BE). Effects of boning time, mechanical tenderization and partial replacement of sodium chloride on the quality and microflora of boneless dry-cured ham. *Journal of Food Science* 52(2); 1987; 263-266

This investigation was carried out to determine if the use of prerigor muscle is a viable alternative to the use of post-rigor muscle in the production of boneless dry, cured hams, to evaluate the effects of mechanical tenderization on the sensory, physical and microbial qualities of boneless dry cured hams and to examine the effects of various levels of KCl replacements for NaCl on the sensory, physical and microbial qualities of the boneless dry cured hams. The results showed that in the production of boneless dry cured hams NaCl can be replaced with KCl upto a level of 30% with no detrimental effects on palatability or microbial quality. However replacement of NaCl with KCl at level of 50% resulted in lower sensory quality. The use of prerigor muscle in the production of the above products had no adverse effect on palatability or microbial parameters. However proper sanitation is found essential while utilising either of these processing parameters in a production system. NGKR

Hamburgers

- 647 Wells (JH), Paul Singh (R) and Noble (AC). A graphical interpretation of time-temperature related quality change in frozen food. *Journal of Food Science* 52(2); 1987; 436-439, 444

Storage studies on the sensory quality changes in frozen hamburger have been carried out using computer graphics. The resulting three dimensional surface ("quality-response surface") was simplified by contour plotting and the responses of both full and partial history time-temp. indicators were superimposed. The resulting indicator action diagrams were developed for frozen hamburger and its possible applications to frozen inventory management have been presented in these studies. NGKR

Sausages

- 648 Jonker (MA), Roon (PSV) and den Hartog (JMP). Quantitative aspects of two methods to dissolve collagen-free muscle proteins from acetone dry powders of Guelders ring sausage. *Zeitschrift für Lebensmittel-Untersuchung und -Forschung* 185(5); 1987; 402-405
- 649 Kuo (JC), Wang (SY), Huang (CJ) and Ockerman (HW). Effects of phosphate type, packaging method and storage time on the characteristics of Chinese sausage. *Journal of Food Processing and Preservation* 11(4);

1987; 325-338

This investigation was carried out to determine the effects of four added phosphates sodium tripolyphosphate, tetrasodium pyrophosphate (TSPP), sodium hexametaphosphate (SHMP) and blended phosphate, two packaging methods (vacuum and non vacuum) and several storage times (0, 2, 4 and 6 wks) on pH, moisture, water holding capacity, thiobarbituric acid values, residual nitrite total aerobic plate counts and total anaerobic plate counts of a Chinese sausage. The results showed that the pH and residual nitrite levels of Chinese sausage were found to be higher ($P < 0.05$) in the group containing TSPP than the other phosphate treatments. Sausages containing SHMP had the lowest pH ($P < 0.05$), the least amount of residual nitrite and the highest TBA values. Chinese sausage which was vacuum packaged had lower ($P < 0.05$) TBA values than non-vacuum packaged sausage during 4-6 wk of storage. No major microbial problems were observed in any of the samples during 6 weeks of storage. NGKR

Poultry

- 650 Hollender (R), MacNeil (JH) and Mast (MG). Effect of fragmentation method and formulation on the quality of patties made from restructured spent layer meat. *Journal of Food Science* 52(2); 1987; 290-293

This study was carried out to determine the effects of fragmentation method and the formulation of starting material on the quality and consumer acceptability of poultry patties prepared from spent layer meat. The results of study indicated that spent layer meat can be profitably utilised to make acceptable restructured products. It is also found that the sensory properties of the products depend on the kind of muscle tissue used. The textural properties which are influenced by the method used for preparation of patties and these properties can be improved in the raw material i.e. spent layer meat thereby increasing the demand of this waste material. NGKR

Chickens

- 651 Wang (SW) and Chen (TC). Yield and tenderness of cured chicken roll products as affected by water addition. *Journal of Food Processing and Preservation* 11(4); 1987; 289-298

Cured chicken roll products were prepared with either skinless breast meat or skinless dark meat from thighs and drumsticks. Similar products were also prepared from pork for comparison. Processing yields were higher for chicken breast meat than for other meat types when added water was greater than 30%. The yield of dark chicken meat products was always the lowest. Added water did not affect (P less than or equal to 0.05) the Warner-Bratzler shear values of the products. Dark chicken meat products were found to be the most tender, while those from pork were the least tender. Increase in mixing time increase (P less than or equal to 0.05) the processing yield of dark chicken meat products. AS

Broilers

- 652 Ang (CYW) and Young (LL). Effect of marination with sodium pyrophosphate solution on oxidative stability of frozen cooked broiler leg meat. *Poultry Science* 66(4); 1987; 676-678

Influence of different concn. of sodium polyphosphate marination of raw broiler halves on oxidative changes in cooked leg meat during frozen storage and thawing and holding periods was studied. MVG

- 653 Mead (GC). Recommendation for a standardized method of sensory analysis for broilers: A report of working group 5-poultry meat quality of the European Federation of WPSA branches. *World's Poultry Science Journal* 43(1); 1987; 64-68

This standard method is proposed by the working group on poultry meat quality of the European Federation of WPSA branches, in order to achieve greater harmonization of the procedures used. The method covers: thawing, cooking, serving, test conditions and test designs. BV

- 654 Proctor (VA) and Cunningham (FE). Influence of marinating on weight gain and coating characteristics of broiler drumsticks. *Journal of Food Science* 52(2); 1987; 286-289, 293

This investigation was carried out to determine the effect of NaCl, a phosphate blend, acids and enzymes on cooking and sensory characteristics of broiler drumsticks and to study the difference in the absorption of marinate distilled water by the broiler drumsticks both at room (23 °C) and refrigerated temp. (4 °C). The results revealed that when additives were grouped according to chemical composition the salts were found to be responsible for the highest coating pick up, acids and enzymes highest cooking loss, acids highest crumb loss and drumsticks marinated in distilled water having the highest overall yield. The taste characteristics did not vary much except that skinless drumsticks found to have low score due to high salt concn. having a drier texture and slight baking soda flavour. NGKR

Spent hens

- 655 Kondaiah (N) and Panda (B). Effect of hot and cold boning of spent hens on carcass components and functional properties of the frozen meat. *International Journal of Food Science and Technology* 22(4); 1987; 413-416

Turkeys

- 656 Savage (TF), Holmes (ZA), Nilipour (AH) and Nakaue (HS). Evaluation of cooked breast meat from male breeder turkeys fed diets containing varying amounts of triticale, variety Flora. *Poultry Science* 66(3); 1987; 450-452

The physical and sensory quality of cooked meat from aged breeder turkey toms fed with diets containing varying amounts of triticale, var. Flora were conducted. Tenderness shear value of cooked breast meat from turkeys fed triticale was significantly improved ($P < .05$) when compared with meat from turkeys fed either corn-soy or triticale soy diets. Results indicate that cooked meat tenderness of aged breeder toms can be influenced by diet. BV

- 657 Swatland (HJ). Fiber optic spectrophotometry of colour intensity problems in raw and cooked turkey breasts. *Poultry Science* 66(4); 1987;

679-682

Similar reflectance spectra were obtained for pale and dark raw pectoralis muscles at 400 nm but diverged prognmies towards 700 nm. When difference spectra (Pale minus dark) were transformed to absorbance values, there was a strong peak at 420 nm and a secondary peak around 550-560 nm (probably myoglobin). In cooked poultry the pale centres of the muscles were compared to dark scans between the muscles. The cooked product had a greatly reduced reflectance of red light (600-700 nm). Absorbance transformations of difference were approx. linear and increase from 340 nm (min.) to 700 (max.). No chromophore was observed in the dark scan which was not present pale centres of the muscles. MVG

- 658 Whang (K) and Peng (IC). Lipid oxidation in ground turkey skin and muscle during storage. *Poultry Science* 66(3); 1987; 458-466

Ground turkey (skin and muscles of thigh and breast were obtained from chilled birds 24 h postmortem and stored aerobically at 4 C and -20 C. Development of lipid oxidation in these samples during storage was followed by measuring 2-thiobarbituric acid (TBA) values and by monitoring changes in fatty acid profiles of polar lipids. Ground thigh developed significantly higher ($P < .01$) TBA values than skin and breast during storage at 4 C for up to 8 days. Under the same storage conditions, arachidonic acid (20:4) decreased significantly ($P < .05$) as a result of lipid oxidation. During frozen storage (-20 C) for up to 30 days, TBA numbers remained low and constant (below 1.0) for all three tissues. However, 20:4 in thigh and breast decreased significantly ($P < .05$) under frozen storage conditions. Evidently, oxidation of polyunsaturated fatty acids in turkey muscle occurred even at -20 C during extended aerobic storage. AS

Poultry products

Eggs

- 659 Britton (WM) and Fletcher (DL). Influence of storage environment on ease of shell removal from hard-cooked eggs. *Poultry Science* 66(3); 1987; 453-457

This study presents influence of practical storage environments that would improve ease of shell removal of hard-cooked eggs. Eggs stored in a closed environment with a 10% NaOH solution improve ease of peel when compared with a storage environment containing just air or water. The average peel score of eggs treated in the NaOH environment was 1.7 compared with scores of 2.4 in an air environment and 2.4 in an environment with water. The NaOH treated environment increased albumen pH to 8.49 compared with 8.11 of eggs stored in the air environment. The influence of environment on egg albumin pH appeared to be the major factor contributing to improved ease of shell removal. BV

- 660 Ozawa (Y). Thermal analysis of raw egg. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi)' 33(12); 1987; 813-820 (Ja).

A raw egg was analyzed by the differential thermal analysis (DTA). Consequently, the egg yolk showed a single endothermic peak,

which began about 69 °C, had a center at 81 °C, and was over about 90 °C. The base line slanted a little at 60 °C. The egg white was separated into a thick white and a thin one. Although their thermograms were different, they had the same two endothermic peaks. The one was called the first absorption peak, which began from about 61 °C, had a center at 65 °C, and was over about 70 °C. The other was called the second absorption peak, which began from about 73 °C, had a center at 79 °C, and was over about 84 °C. The phase transition was observed together with the first absorption of the thin white, but was not observed in the thick one. The thin one was thermodynamically in a state of equilibrium to the 13% glycerol aqueous solution under 60 °C and its properties were similar to those of an aqueous ovalbumin solution. Since the thermogram of the thick one added 3% NaCl resembled closely to that of the thin one, it was considered that the thin one was equivalent to the thick one whose phase had been changed. AS

Egg yolk

- 661 Awazuhara (H) and Nakamura (R). Foaming properties of egg yolk low density lipoprotein and ovalbumin. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi)' 33(12); 1987; 854-858

Foaming properties of egg yolk low density lipoprotein (LDL) were compared with those of ovalbumin, a typical globular protein of egg white. Foaming power of LDL was almost the same as that of ovalbumin, but its foam stability was much lower. When the concn. of LDL was exceedingly high, its foam stability corresponded to that of ovalbumin. Foaminess of LDL occurred at the presence of relatively large amount of peanut oil. These characteristics of LDL foaminess were also ascertained by the measurement of surface chemical properties of LDL. AS

SEAFOODS

- 662 Anon. Seafood-its importance in our diet. *Seafood Export Journal* 19(11); 1987; 15-16

A brief but informative note, on the nutritive value of fish and shell-fish and how to assess the quality of (freshness) of fish at the time of purchase. Though fish like salmon and tuna do not contain cholesterol, fatty fish contain about 0.7 mg/g, and shell fish as much as 1.5 mg/g compared to the cholesterol content of approx. 0.9 mg/g in beef or mutton. KMD

- 663 Venugopal (V) and Nerkar (DP). Elimination of *Salmonella* and other pathogens from frozen seafoods by radiation. *Seafood Export Journal* 19(11); 1987; 11-13

The authors have found that microorganisms like *Salmonella*, *Vibrio* and *Aeromonas* are comparatively sensitive to gamma irradiation, and can be easily inactivated by subjecting fresh or frozen blocks of seafoods to low doses of gamma irradiation (4-5 kilo Gray). KMD

Fish

- 664 Ababouch (L), Chougner (L) and Busta (FF). Causes of spoilage of thermally processed fish in Morocco. *International Journal of Food Science and Technology* 22(4); 1987; 345-354

Microbiological analysis and container closure evaluation of spoiled cans of fish obtained from Moroccan local stores and canneries and detn. of probable cause of spoilage of each case is investigated. The performance of the canning operation and implementation of efficient quality control programmes in Moroccan fish canning industry is also considered. BV

- 665 Corey (ML), Gerdes (DL) and Grodner (RM). Influence of frozen storage and phosphate predips on coating adhesion in breaded fish portions. *Journal of Food Science* 52(2); 1987; 297-299

- 666 Fernandez-Salguero (J) and Mackie (IM). Preliminary survey of the content of histamine and other higher amines in some samples of Spanish canned fish. *International Journal of Food Science and Technology* 22(4); 1987; 409-412

- 667 Furst (P), Kruger (C), Meemken (HA) and Grobebel (W). Levels of the PCB-substitute ugilec (tetrachlorobenzyl-toluenes) in fish from areas with extensive mining. *Zeitschrift fur Lebensmittel-Untersuchung und -Forschung* 185(5); 1987; 394-397 (De).

Tetrachlorobenzyltoluenes used as hydraulic fluids in underground mining can enter the environment via pit water, mine out puts or ventilation systems and can contaminate the food-chain; especially in fish. The concn. of tetrachlorobenzyltoluenes in edible portions of fish from these areas ranged up to 25 mg/kg. BV

- 668 Ishikawa (M), Mori (S), Watanabe (H) and Sakai (Y). Softening of fish bone. I. Relation between softening rate and solubilization rate of organic matter from fish bone. *Journal of Food Processing and Preservation* 11(4); 1987; 277-287

- 669 Kurade (SA) and Baranowski (JD). Prediction of shelf life of frozen minced fish in terms of oxidative rancidity as measured by TBARS number. *Journal of Food Science* 52(2); 1987; 300-302, 311

This study was carried out to determine by including intrinsic factors of the muscle composition models could be obtained to give a more accurate prediction of TBARS based shelf life from measurements made over a relatively short period of time. These models were found to be useful in providing a fairly rapid estimation of the TBA number based shelf life of frozen minced fish. NGKR

- 670 Tsuyuki (H). Food chemical studies on the lipids in agricultural and fishery products. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi)' 33(12); 1987; 859-866 (Ja).

Cod

- 671 Pellegrino (C), Cattaneo (P) and Cantoni (C). Formaldehyde levels in frozen, cured and dried cod products. *Industrie Alimentari* 26(5); 1987; 472-474 (It).

Haddock

- 672 Fernandez-Salguero (J) and Mackie (IM). Comparative rates of spoilage of fillets and whole fish during storage of haddock (*Melanogrammus aeglefinus*) and herring (*Clupea harengus*) as determined by the formation of non-volatile and volatile amines. *International Journal of Food Science and Technology* 22(4); 1987; 385-390

Herring

- 673 Slabyj (BM), Maloy (T), Cook (WP) and Risser (JA). Effect of brining and canning on salt uptake and retention by herring (*Clupea herengus*) examined using four analytical methods. *Journal of Food Protection* 50(7); 1987; 602-607

The effect that temp. and delayed brining, as practiced by marine sardine industry, on salt uptake, was determined. The accuracy of several analytical methods, QUANTAB, specific ion electrode, inductively coupled plasma spectrometer and potentiometer, that can be used in salt detn. were evaluated. MVG

Fish products

Surimi

- 674 Reppond (KD), Edson (SA), Babbitt (JK) and Hardy (A). Observations on the functional properties of U.S. Land-processed surimi. *Journal of Food Science* 52(2); 1987; 505-506

The quality of surimi, a marine refined fish product is evaluated by several methods as it is processed by different methods including land and ship processing. The fold test is useful to distinguish between high and low quality surimi but lacks sensitivity. It was seen that moisture content was linearly proportional to the functional properties of U.S. Land processed surimi and need is felt to carry out further work to correlate the results of various tests to the sensory quality properties of the finished products. NGKR

Mackerel

- 675 Venugopal (V), Alur (MD) and Nerkar (DP). Storage stability of nonpackaged irradiated Indian mackerel (*Rastrelliger kanagurta*) in ice. *Journal of Food Science* 52(2); 1987; 507-508

The shelf life of nonpackaged irradiated Indian mackerel in ice has been investigated. The storage stability studies showed that pre-packaging in polythene pouches before irradiation gave shelf life of 25 days; nonpackaged, irradiated fish 20 days and nonpackaged, non irradiated fish kept in ice gave 14 days. The nonpackaged irradiated fish has better appearance, less irradiation odour as compared to packaged irradiated fish thus showing that preirradiation was not

found necessary to commercial storage of iced fish. NGKR

Oysters

- 676 Faille (D), Hackney (G), Reilly (L), Cole (M) and Kilgen (M). Seasonal variation in fecal coliform population of Louisiana oysters and its relationship to microbiological quality. *Journal of Food Protection* 50(7); 1987; 545-549

Shellfish

- 677 Nwokolo (E). Nutrient composition of tropical shellfish. *Nutrition Reports International* 36(2); 1987; 291-299

The proximate composition of four tropical shellfish oyster (*Crassostrea gasar*), mussel (*Mytilus* spp), periwinkle (*Littorina* spp.) and snail (*Vicapara quadrata*) for minerals, amino acid and fatty acids has been determined. The analysis was carried out using AOAC methods. The results showed that most shellfish had very high concn. of phosphorus, calcium, magnesium, potassium, and iron content. Protein and amino acid contents were high and essential amino acid patterns were excellent and periwinkle and mussel had very high concn. of copper and iron resp. There was a higher content of n-3 polyunsaturated fatty acids (PUFAs) in oyster, periwinkle and mussel than in snail whereas oyster and mussel had a low content of n-6 PUFAs while periwinkle and snail had a high content of these fatty acids. NGKR

Shrimps

- 678 Cano-Lopez (A), Simpson (BK) and Haard (NF). Extraction of caroteno-protein from shrimp process wastes with the aid of trypsin from Atlantic cod. *Journal of Food Science* 52(2); 1987; 503-504, 506
- 679 Mathen (C), Krishna Rao (K) and Thomas (F). Losses due to leaching of nutrients and flavouring components during commercial handling and processing of shrimps. *Indian Journal of Animal Sciences* 57(11); 1987; 1242-1244

Reports a study on the levels of dry-matter content in commercially available frozen and unfrozen shrimp. Results showed 14.4% dry-matter in frozen shrimp meat and 21% in frozen headless shrimps. The dry-matter increases with increase in size of the shrimp irrespective of type of dressing. No significant difference was seen in DM content of samples of the same type and size grade of different species. The DM content was also related to prefreezing ice storage period. The results are discussed in relation to the DM content in fresh minced shrimp meat handled under controlled conditions. The loss in DM during handling preservation and processing is very high and there is a need to prevent it. BV

PROTEIN FOODS

- 680 Khan (NH) and Bressani (R). Preparation and nutritional quality of high protein food extracts from immature corn, whole soybean and dry whole milk. *Qualitas Plantarum - Plant Foods for Human Nutrition* 37(2); 1987; 141-149

Five foods were prepared from water extracts of immature corn (IC), immature corn-milk (CM) and immature corn-whole soybean (CS). The protein food prepared were mixed in a proportion of 7:3 (w/w, dry basis). The protein quality of 3 foods (IC, CM and CS) were evaluated and compared with that of casein. They had same digestibility (87-88%) but differed in protein quality. The corn-soy foods, CS-1 and CS-2, had almost the same digestibility as that of casein. The production cost of corn-soy food will be cheaper than the corn-milk food. BV

Infant foods

- 681 Florence (E), Knight (DJ) and Harris (WM). Nutrient composition of infant formulae. *Journal of the Society of Dairy Technology* 40(2); 1987; 37-42

A survey was carried out to assess the nutritional composition of infant formulae currently available in the UK. Eleven products were analysed for major constituents, gross energy, minerals and amino acids. Results were compared with manufacturers' data and also with existing UK compositional guidelines. Analytical values for all constituents were in good agreement with manufacturers' data and generally within the recommended guidelines. The chloride content of one product was found to be marginally below the min guideline and not in accord with the labelled value. An investigation into methodology in collaboration with the manufacturer revealed a marked difference in results (approx. equal to 10%) according to the choice of method. This difference accounts for the discrepancy between the survey and labelled values. AS

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Alcoholic beverages

- 682 O'Palka (J), Eidet (I) and Jackson (LL). Neural lipids traced through the beverage alcohol production process. *Journal of Food Science* 52(2); 1987; 515-516

Changes in lipids were found to be due to the dried distillers grain with solubles (DDGS) from the process for the production of alcohol from malt. Previous observations also were attributed to the above byproduct. The levels of triacylglycerols were found to fall while free fatty acid (FFA) increase at the stage of mashing and distillation. No FFA degradation took place during drying and minor quantities of fatty acid ethyl esters (4-5%) were also formed during fermentation. NGKR

Beer

- 683 Beldman (G), Hennekam (J) and Voragen (AGJ). Enzymatic hydrolysis of beer brewers' spent grain and the influence of pretreatments. *Biotechnology and Bioengineering* 30(5); 1987; 668-671

Spent grain is the residue of malt and grain which remains in the mash kettle after the liquefied and saccharified starch has been

removed by filtration. This paper describes various enzymatic treatments, chemical and physical treatments using brewers' spent grain as a substrate. MVG

- 684 Heintz (OE). Aspects of beer foam formation and head retention. *Technical Quarterly, Master Brewers' Association of the Americas* 24(2); 1987; 58-60

An important feature of the attractiveness of the product to the consumer is the ability to form a stable foam head. Therefore, the technical/practical approach to beer has been outlined and the physical properties of beer foam formation and foam adhesion are discussed.

- 685 Kemper (EA) and Patino (H). Method analysis of equilibrium-based oxygen determinations in packaged beer. *Technical Quarterly, Master Brewers' Association of the Americas* 24(2); 1987; 39-43

The way several variables affect the equilibrium calculations used to express the total oxygen concn. as a function of headspace (vapour) oxygen concn. obtained by Hersch cell or other analytical devices, was studied using a computer program. MVG

- 686 Stassi (P), Rice (JF), Munroe (JM) and Chicoye (E). Use of carbon dioxide evolution rate for the study and control of fermentation. *Technical Quarterly, Master Brewers' Association of the Americas* 24(2); 1987; 44-50

Use of flow meters to monitor the carbon dioxide evolution rate (CER) of lager beer fermentation and the relationships observed between CER and product characteristics was studied. An example of process control using the CER is given. MVG

Breweries

- 687 Behrman (CE) and Larson (JW). On-line ultrasonic particle monitoring of brewing operations. *Technical Quarterly, Master Brewers' Association of the Americas* 24(2); 1987; 72-76

- 688 Gomez (OA). Recovering by-products in a brewery. *Technical Quarterly, Master Brewers' Association of the Americas* 24(2); 1987; 66-71

Describes different stages where it is possible to recover by-products and to reduce waste in a profitable way. Some of these stages in the brewing process are described from the point of view of how they add to environmental pollution. MVG

- 689 Syd Love (L). Anaerobic degradation: More cost effective-more energy efficient treatment of brewery effluents. *Technical Quarterly, Master Brewers' Association of the Americas* 24(2); 1987; 51-54

Wort

- 690 Taki (S), Tsubota (Y) and Murakami (M). Application of screw type vapour recompression to wort boiling process. *Technical Quarterly, Master Brewers' Association of the Americas* 24(2); 1987; 61-65

Cashew liquor

- 691 Augustin (A). Cashew liquor and wine. *Indian Cashew Journal* 18(2); 1987; 19-21

Investigates the feasibility of producing high quality liquor from cashew apple and standardising method for producing wine from cashew apple. BV

Cider

- 692 Wheeler (JL), Harrison (MA) and Koehler (PE). Presence and stability of patulin in pasteurized apple cider. *Journal of Food Science* 52(2); 1987; 479-480

This study was undertaken to screen various pasteurised apple cider samples produced in Georgia for patulin levels in contaminated batches and to determine the effects of thermal processing on patulin stability. 8 high temp. short time (HTST) treatments (60, 70, 80 and 90 C for 10 sec.; 90 C for 20, 40, 80 and 160 sec) and one batch treatment 90 C for 10 min were used to determine the stability of patulin in pasteurised cider. The results showed that 60, 80 and 90 C HTST treatments and the batch pasteurization significantly reduced the patulin level but did not totally destroy the contaminant whereas the storage of the cider had no effect on the level of the toxin. NGKR

Wines

- 693 Reeves (MJ), Davis (CR) and Brooks (JD). Malo-lactic fermentation-an important second. *Food Technology in New Zealand* 22(2); 1987; 22-23

In this paper work on the suitability of a new lyophilised malo lactic fermentation culture introduced in New Zealand as a means of inducing rapid MLF in winemaking is described. Trials were carried out on 1.5 l. quantities of must inoculated at a rate of 1% with a pure culture of *Saccharomyces cerevisiae* and progress of MLF in the trial wines was monitored by pH measurements and paper chromatography of organic acids. Results revealed that this lyophilised MLF is convenient to reactivate and rapidly produce a high concn. of viable organisms and can be used at the time of crushing or normal yeast inoculation in the absence of sulphur dioxide. If sulphur dioxide is used 24 h waiting period is required before the addition of the reactivated culture. If the must is inoculated early the MLF is completed most rapidly. NGKR

Non-alcoholic beverages**Coffee**

- 694 Baltes (W) and Bochmann (G). Model reactions on roast aroma formation. IV. Mass spectrometric identification of pyrazines from the reaction of serine and threonine with sucrose under the conditions of coffee roasting. *Zeitschrift für Lebensmittel-Untersuchung und -Forschung* 184(6); 1987; 485-493

From the volatiles of model roastings, where serine, threonine

and sucrose (in different relations) were treated under the conditions of coffee roasting, 123 mono- and bicyclic pyrazines were separated and identified by HRGC/MS. The spectra obtained were identified; among them 12 products which according to their behaviour were postulated to be furfurylpyrazines. AS

- 695 Baltes (W) and Bochmann (G). Model reactions on roast aroma formation. III. Mass spectrometric identification of pyrroles from the reaction of serine and threonine with sucrose under the conditions of coffee roasting. *Zeitschrift für Lebensmittel-Untersuchung und -Forschung* 184(6); 1987; 478-484

Numerous alkyl- and acylpyrroles, two 2, 3-dihydro[1H]pyrrolizines, furfurylpyrroles and one furanylpyrrole were identified in the volatiles of roasting serine, threonine and sucrose. The formation of the alkylpyrroles was suggested to proceed via a pyrolytic pathway because they were formed in the absence of sucrose. The retention indices and mass spectra are reported together with selected mass spectrometric fragmentations. A great number identified compounds were also recognized in the roast coffee volatiles. AS

- 696 Heinrich (L) and Baltes (W). Occurrence of phenols in coffee melanoidins. *Zeitschrift für Lebensmittel-Untersuchung und -Forschung* 185(5); 1987; 366-370 (De).

Seven fractions having different mol. wt. from roast coffee separated by means of adsorption chromatography followed by gel chromatography were tested sensorially and degraded by curie point pyrolysis. High-resolution GC/MS (HRGC/MS) of 100 products, 33 phenols were found. The products were compared with fragments formed via model pyrolysis experiments on chlorogenic acid. BV

- 697 Nackunstz (B) and Maier (HG). Determination of cafestol and kahweol in coffee. *Zeitschrift für Lebensmittel-Untersuchung und -Forschung* 184(6); 1987; 494-499 (De).

Cafestol and Kahweol have been determined in coffee by novel HPLC and TLC techniques. One Arabica and two Robusta green coffees contained about 6 g/kg and 2 g/kg cafestol resp. Kahweol (2 g/kg) was present only in Arabica coffee. These decreased during roasting. The highest cafestol contents were found in beverages boiled for 10 min. No difference was observed between normal and decaffeinated commercial blends. In these commercial coffee extracts no cafestol or kahweol could be detected. BV

- 698 Nicoli (MC), Dalla Rosa (M) and Lerici (CR). Chemical properties of espresso coffee brew: 1st note. Kinetics of caffeine diffusion and solids extraction. *Industrie Alimentari* 26(5); 1987; 467-471 (It).

Kinetics of diffusion of caffeine and extraction of solids, into brew from commercial dark roasted and ground coffee is evaluated. The stability of caffeine during a dark roasting as well as the Italian roasting process was also determined. BV

Fruit juices

- 699 Cole (MB), Franklin (JG) and Keenan (MHJ). Probability of growth of the spoilage yeast *Zygosaccharomyces bailii* in a model fruit drink

system. *Food Microbiology* 4(2); 1987; 115-119

In this paper individual and combined effects of pH, brix, sorbic acid, benzoic acid, and sulphur dioxide on the probability of growth of the spoilage yeast *Zygosaccharomyces bailii* in a model fruit drink system have been quantified. In this connection a quantitative method for the above detn. is described here. A factorial designed experiment employing a micro-titre-plate system was used to assess the effect on growth of culture pH and fructose concn. (Brix) as well as the weak-acid preservatives benzoic acid, sorbic acid and sulphur dioxide. The resulting equation demonstrates a synergistic effect between Degree Brix level and weak-acid concn. which is dependent on pH and by quantifying this the present model can be a useful tool not only to assess the preservative systems but also during product formulation. NGKR

- 700 Zache (U) and Grunding (H). Determination of acesulfame-K, aspartame, cyclamate and saccharin in fruit juice beverages. *Zeitschrift fur Lebensmittel-Untersuchung und -Forschung* 184(6); 1987; 503-509 (De).

Isotachophoresis and reverse-phase-HPLC methods are compared for the detn. of acesulfame-K, aspartame, cyclamate, and saccharin in beverages. BV

Apple juices

- 701 Hoo (AF) and McLellan (MR). The contribution effect of apple pectin on the freezing point depression of apple juice concentrates. *Journal of Food Science* 52(2); 1987; 372-374, 377

This investigation was carried to study apple ripening in storage and changes in soluble pectin concn. and freezing point to analyse and quantify the freezing point effects of soluble pectin in apple juice conc. by response surface methodology. After preparation of the conc. by conventional procedures the experiments are conducted and the results indicated that pectin contributed to the freezing point depression of apple juice conc. the effect of which was greater with increasing concn. It was also found that the untreated apple juice conc. (with pectin intact) had a lower freezing point as compared to the depectinised juice. The freezing point of the apple juice conc. was found to decrease as the apples ripened due to an increase in the soluble pectin. NGKR

- 702 McLellan (MR), Lind (LR) and Kime (RW). A shelf life evaluation of an oriented polyethylene terephthalate package for use with hot filled apple juice. *Journal of Food Science* 52(2); 1987; 365-368

The use of oriented polyethylene terephthalate (OPET) containers for packaging of hot filled apple juice has been evaluated during a year long storage. Freshly made juice as well as single strength juice reconstituted from apple juice conc. have been evaluated. The results indicated that OPET offer better protection by way of acting as barrier to oxygen permeation over a 6-9 month period as compared to glass packaging. Surface -to-volume effects did not become significant until the last stage of the storage period. Many other storage tests established better shelf life of the product packed in OPET as compared to glass container. NGKR

- 703 Rao (MA), Acree (TE), Cooley (HJ) and Ennis (RW). Clarification of apple juice by hollow fiber ultrafiltration fluxes and retention of odour-active volatiles. *Journal of Food Science* 52(2); 1987; 375-377

In this investigation clarification studies on fresh apple juice in a pilot scale ultrafiltration (UF) unit with membranes made of polysulfone and polyamide and plate and frame and vacuum drum filters were carried out. Results of experiments showed that optimum pressure was about 140 KPa and retention of odour active volatiles was highest in plate and frame filtered juice and lowest in vacuum drum filtered juice. It was also found that the retention of odour active volatiles in UF juice was intermediate to the two traditional filtration methods. Retention of odour-active volatiles in the permeate of a polyamide membrane was higher than that of a polysulfone membrane. NGKR

Citrus juices

- 704 Kimball (DA). Debittering of citrus juices using supercritical carbon dioxide. *Journal of Food Science* 52(2); 1987; 481-482

The use of supercritical carbon dioxide in removing limonin from citrus juices has been investigated. In this study with reconstituted early season California Washington navel conc. pressures between 3000-6000 p.s.i and temp. between 30-60 C. were used to debitter and it was found that an average reduction of 25% in limonin contents was found in 91 60 min runs. Four hour runs debittered the juice reducing the limonin content from approx. 17.5 p.p.m to approx. 7.0 p.p.m without affecting the ascorbic acid, pulp, titratable acidity and total amino acids. However oil levels dropped slightly but can be replenished in commercial operation without violation of the federal standards of identity. NGKR

Lemon juices

- 705 McBride (RL) and Johnson (RL). Perception of sugar-acid mixtures in lemon juice drink. *International Journal of Food Science and Technology* 22(4); 1987; 399-408

Acid was removed from lemon juice by selective adsorption on to a weak-base resin. Four levels each of sucrose and citric acid were combined factorially and dissolved in the low-acid juice, providing sixteen stimulus combinations. Using graphic-rating scales, assessors evaluated the stimuli for intensities of overall flavour, sweetness, and acidity; the relation of each of these intensities to ideal and general acceptability. The various acceptability responses proved to be internally consistent, and the experiment suggested an optimum sugar-acid blend from the sixteen combinations. Ratings of overall flavour strength followed a compressed pattern in a factorial plot, with increasing concn. of sugar and acid exerting a diminishingly small effect. In the perception of individual components, sucrose clearly suppressed the perceived intensity of citric acid, but only the highest concn. of acid unequivocally suppressed sweetness. There was a striking similarity between each set of intensity responses and the corresponding ideal-relative responses, suggesting a link between intensity and hedonics. AS

Orange juices

- 706 Wicker (L), Braddock (RJ) and Vassallo (M). Effect of assay temperature on activity of citrus pectinesterase in fresh orange juice. *Journal of Food Science* 52(2); 1987; 378-380

Passion fruit juices

- 707 Chiang (BH) and Yu (ZR). Fouling and flux restoration of ultrafiltration of passion fruit juice. *Journal of Food Science* 52(2); 1987; 369-371, 380

FATS AND OILS

- 708 Homberg (E). Rapid method for isolation of sterols from fats and oils. *FAT Science and Technology* 89(6); 1987; 215-220 (De).

Isolation of sterols from fats and oils mostly takes place by the very time consuming solvent extraction of the unsaponifiable from the soap solution. The time required can be reduced to about 1 h by a new developed procedure which makes possible to separate soaps and polar components of the fats from the saponified sample by aluminium oxide columns. The use of 250 mg of fat is sufficient for a following sterol examination by gas chromatography. AS

Fats

Lipids

- 709 Hamid (S), Khan (SA), Saeed (M), Bhatti (MK) and Iqbal (MZ). Studies on the lipid production by *Penicillium lilacinum*. *FAT Science and Technology* 89(6); 1987; 250-252

The present study describes the utilization of carbohydrate rich wastes (Molasses and waste liquors from cereals, vegetables, and fruit processing units) into lipids using *Penicillium lilacinum*. Lipid production by *P. lilacinum* in media containing various ratios of carbon and nitrogen and factors affecting the lipid synthesis from diverse sources of carbon and nitrogen have been studied. From nitrogen sources, sodium nitrate produced 22.5% fat. Chemical examination of the fat revealed that it is composed of the usually occurring fatty acid glycerides. From the abundant availability of fermentable carbon sources the production of microbial fat can be achieved economically. The fermentation will provide a biomass rich in proteins which can be used in animal feeds. Biological evaluation of fat is needed prior to their use as an edible fat. AS

Oils

- 710 Mohana das (C) and Indrasenan (P). Determination of iodine-bromine numbers of some edible oils with two N-bromoimides. *International Journal of Food Science and Technology* 22(4); 1987; 339-344

Two sample titrimetric methods is reported for detn. of the iodine-bromine numbers of some edible oils (coconut oil, gingelly oil, groundnut oil, mustard oil, palm oil and sunflower oil) using N-

bromoimides, N-bromophthalimide, and N-bromosaccharin as reagents. The proposed excess-back titration methods were based on quantitative bromination of the glycerides of unsaturated fatty acids present in the oils and both the methods were simple, rapid and accurate. BV

- 711 Raney (JP), Love (HK), Rakow (GFW) and Downey (RK). An apparatus for rapid preparation of oil and oil-free meal from brassica seed. *FAT Science and Technology* 89(6); 1987; 235-237

Describes an apparatus for rapid preparation of oil and 'oil-free' meal samples from Brassica seed. Batches of 60 0.2 g to 2.0 g of seed samples can be ground and solvent extracted simultaneously followed by filtration, solvent washing and vacuum drying of the meal. The apparatus also facilitates gravimetric oil content detn. BV

Coconut oils

- 712 Graille (J), Muderhwa (J) and Pina (M). A method for determination of interesterification activity of biocatalysts. *FAT Science and Technology* 89(6); 1987; 224-226

The study of 1-3 regioselective interesterification of melted fats catalysed by lipases, worked as various catalytic preparations, involves a special assay for activity detn. allowing trustworthy and significative comparisons between the different biocatalysts. The reference system is the mixture of methyl stearate and coconut oil. It has been shown that hydrolytic activity determined as usual, is completely independent from the interesterification activity expressed in micromole of lauric acid incorporated in the methyl stearate per minute and per gramme of biocatalyst. Water activity also plays an important role in the course of the reaction; water activity must be maintained under 0.5. AS

Groundnut Oils

- 713 Raheja (RK), Batta (SK), Ahuja (KL), Labana (KS) and Singh (M). Comparison of oil content and fatty acid composition of peanut genotypes differing in growth habit. *Qualitas Plantarum - Plant Foods for Human Nutrition* 37(2); 1987; 103-108

Peanut genotypes belonging to Virginia Runner, Virginia Bunch and Spanish Bunch groups exhibiting spreading, semi-spreading and erect growth habits, resp., were compared for oil content and fatty acid composition. Mean values of oil content of the three peanut groups did not differ much, however, a marked difference was observed in fatty acid composition. Oleic acid concn. were in the order Virginia Runner > Virginia Bunch > Spanish Bunch. This trend was reversed with respect to linoleic acid concn. Virginia Runner genotypes having higher oleic-linoleic acid (O/L) ratio and corresponding lower iodine value of oil have greater oil stability and would incur lower cost of hydrogenation. Oil of Spanish Bunch and Virginia Bunch genotypes is nutritionally better due to a higher concn. of linoleic acid and may be used as refined oil. Oleic acid concn. was negatively correlated with that of linoleic acid suggesting that selection of genotypes in each group with improved industrial or nutritional qualities would be possible. AS

Soybean oils

- 714 Benedetti (PC), D'Aquino (M), Di Felice (M), Gentili (V), Tagliamonte (B) and Tomassi (G). Effects of a fraction of thermally oxidized soybean oil on growing rats. *Nutrition Reports International* 36(2); 1987; 387-401

In this investigation the effects of a peroxidized-polymerized(PO-PM) fraction isolated from soybean oil on various biochemical parameters in growing rats fed a synthetic diet have been studied. Three groups of male rats were fed diets containing 0, 5 and 10% of the PO-PM fraction for 5 wk. The analysis indicate that PO-PM fraction of soybean oil depressed the growth rate of experimental animals thereby showing that although the thermooxidised fraction does not produce marked toxic effects but causes alterations of normal metabolic process and confirms the presence of some antinutritional factors. NGKR

SPICES AND CONDIMENTS

Nil

SENSORY EVALUATION

- 715 Christensen (CM) and Casper (LM). Oral and nonoral perception of solution viscosity. *Journal of Food Science* 52(2); 1987; 445-447

In this study the judgements of solution viscosity obtained by oral and nonoral modes of sensing were compared. Solution viscosity can be perceived by more than one sensory modality or method of sensory exploration. It has been found that the slopes of the functions which describe physical and perceivable viscosity were found to be similar for the different methods but the solutions were perceived as more viscous as judged by the mouth. NGKR

- 716 Redlinger (PA) and Setser (CS). Sensory quality of selected sweeteners: Aqueous and lipid model systems. *Journal of Food Science* 52(2): 1987; 451-454

The effects of selected ingredients on sweetness perception of some carbohydrate and nonnutritive sweeteners in various model systems have been studied. The sweetness characteristics of sucrose, fructose, aspartame, acesulfame K, Sodium saccharin and calcium cyclamate were studied in aqueous and lipid model food systems with and without lemon or vanilla flavouring. The analysis of variance showed that flavour did not influence sweetness except where residual sweetness was more strong in lemon and vanilla solutions than in normal solutions. Variations were observed in intensity and sweetness between systems and sweeteners and the character of the food system. NGKR

FOOD STORAGE

- 717 Sharma (A), Padwal-Desai (SR) and Nadkarni (GB). A new method for aflatoxin-free storage of agricultural commodities. *Journal of Food Science* 52(2); 1987; 497, 499

In this investigation the efficiency of 2-chloroethyl phosphonic acid (CEPA) for removal of aflatoxins during storage of peanuts and corn has been studied. The incidence of aflatoxins was reported in experimental lots of peanuts and corn stored for 90 days at 28-30 C and R.H. 100% when infected with spores of aflatoxin producing strains of *Aspergillus parasiticus*. But when these samples were treated with an aqueous solution of CEPA, aflatoxin formation was prevented in both the commodities whereas in the untreated samples aflatoxin formation was reported. NGKR

INFESTATION CONTROL AND PESTICIDES

Infestation control

Insects

- 718 Breer (H) and Sattelle (DB). Molecular properties and functions of insect acetylcholine receptors. *Journal of Insect Physiology* 33(11); 1987; 771-790

This review covers the various properties and functions of insect acetylcholine receptors with particular reference to cholinergic synaptic transmission, acetylcholine receptors of vertebrates, insect acetylcholine receptors in development, functional roles of receptor subclasses, receptor/channel properties, ligand binding characterisation, molecular properties and conclusions. NGKR

- 719 Prestwich (GD). Chemistry of pheromone and hormone metabolism in insects. *Science, USA* 237; 1987; 999-1006

The synthesis of radioactively labeled insect hormones and pheromones with high specific activity makes it possible to approach the characterization of the receptor and catabolic proteins that convert chemical signals to biochemical events. The design of reactive (or latently reactive) analogs of these intra and inter organism chemical messengers will allow covalent modification of the proteins of interest. The information derived from this approach will aid in the dissection of the molecular processes involved in olfactory transduction and in JH-mediated gene regulation. Moreover, a better understanding of the chemical parameters for these processes can lead to more selective and environmentally acceptable modes of pest control. AS

- 720 Raina (AK), Jaffe (H), Klun (JA), Ridgway (RL) and Hayes (DK). Characteristics of a neurohormone that controls sex pheromone production in *Heliothis zea*. *Journal of Insect Physiology* 33(11); 1987; 809-814

A neuropeptide hormone that controls production of the sex pheromone in *Heliothis zea* females, originates in the sub-oesophageal ganglion. Because of the difficulty in separating brain from sub-oesophageal ganglion, the entire complex was used in all the experiments unless otherwise stated. Pheromonotropic activity was maximal in brain + sub-oesophageal ganglion extracts from 1-2 day old adults. This age corresponds to normal peak pheromone production in the females. The hormone caused significant pheromonotropic activity within 15 min after injection of the brain + sub-oesophageal ganglion homogenate into ligated females, and reached the peak in 4 h. Activity was detected with a crude preparation of the hormone at 1/8th brain + sub-oesophageal ganglion equivalent. Occurrence of pheromonotropic activity in brain + sub-oesophageal ganglion homogenates from other moth species and a species of cockroach indicates the wide distribution of hormones with similar activity. AS

Pesticides

- 721 Aizawa (K). Microbial control and microbial insecticides in the twenty-first century. Japan Pesticide Information (50); 1987; 8-10

Covers historical development of microbial insecticides, microbial insecticides as promising agents for insect pest control in the twenty-first century, bioinsecticides regulation law in Japan and organization of a pest control agency. BV

BIOCHEMISTRY AND NUTRITION

- 722 Nygren (C). Relations between breakfast habits and blood sugar levels. Var Foda 39(6); 1987; 259-265

Biochemistry

- 723 Ames (JM). A comparison of the colour properties of six heated sugar/amino acid model systems. Chemistry and Industry (18); 1987; 659-661
- 724 Fordyce (EJ), Forbes (RM), Robbins (KR) and Erdman (JWJr). Phytate x calcium/zinc molar ratios: Are they predictive of zinc bioavailability?. Journal of Food Science 52(2); 1987; 440-444
- 725 Kitchen (KT) and Brown (JL). Biochemical effects of two promoters of hepatocarcinogenesis in rats. Food and Chemical Toxicology 25(8); 1987; 603-607

Selected hepatic biochemical effects of two promoters of hepatocarcinogenesis have been studied. MVG

Proteins

- 726 Matheis (G) and Whitaker (JR). Enzymatic cross-linking of proteins applicable to foods: Review. Journal of Food Biochemistry 11(4); 1987; 309-327

This review discusses transglutaminase lipooxygenases, polyphenol oxidase and peroxidase, lysyl oxidase, protein disulphide reductase

and protein disulphide isomerase, sulhydryl oxidase cross linking of proteins applicable to foods in order to change the functional properties. NGKR

- 727 Maxim (S), Flondor (A) and Carpov (A). Ionic binding of biologically active proteins on cross-linked acrylic macromolecular supports. *Bio-technology and Bioengineering* 30(5); 1987; 593-597

Some biologically active proteins were immobilised on acrylic ion exchange supports. The cross linking, swelling coefficient and mol. wt. of the enzyme influenced the immobilisation process. It was indicated by kinetic data that it was mainly a binding process controlled by diffusion. The uptake coefficient values of different proteins ranged between 35.0 and 98.00%. Laboratory experiments on some obtained enzyme/preparation certify the catalytic activity following immobilisation. MVG

Nutrition

- 728 Rajammal (PD). Need for introducing nutrition education in the lab-to-land and food for work programme. *Indian Farming* 36(8); 1987; 27-31

TOXICOLOGY

- 729 de March (BGE). Mixture toxicity indices in acute lethal toxicity tests. *Archives of Environmental Contamination and Toxicology* 16(1); 1987; 33-37

A method for Mixed Toxicity Indices (MTI), an effective approach to describe and predict the effects of mixtures of toxicants, has been described to obtain from response surface equations or from tolerance models similar to the toxic units is presented as a model. Methods of calculating several MTIs with desirable properties from multivariate probit response surfaces is demonstrated. MVG

- 730 Gangolli (SD). The toxicology of smoked foods. *IFST Proceedings* 19(2); 1986; 68-78

Briefly reviews the toxicology of two important groups of compounds (polycyclic aromatic hydrocarbons and heterocyclic aromatic amines) present in smoked foods (charcoal-broiled steaks, Barbecued ribs, Barbecued pork and beef, baked bread and biscuits, and normal roasted coffee). The health hazard posed by these compounds at levels encountered in foods and estimated human daily intake is also assessed. Also covered is toxicological information on smoke flavours, biological effects (carcinogenicity) in experimental animals and in vitro systems, and dietary constituents known to alter their toxicity. BV

- 731 Schiefer (HB), Rousseaux (CG), Hancock (DS) and Blakley (BR). Effects of low-level long-term oral exposure to T-2 toxin in CD-1 mice. *Food and Chemical Toxicology* 25(8); 1987; 593-601

Amines

- 732 Alldrick (AJ) and Rowland (IR). Counteraction of the genotoxicity of some cooked-food mutagens by biogenic amines. *Food and Chemical Toxicology* 25(8); 1987; 575-580

The biogenic amines tryptamine, 5-hydroxytryptamine, tyramine and histamine were assessed for their abilities to modify the genotoxicity of the cooked-food mutagens IQ, MeIQ_x, Trp-P-1 and Trp-P-2. These measurements were made using a bacterial mutation assay with hepatic fractions from either SWR mice or DSN Syrian hamsters as the activating system and *Salmonella typhimurium* TA98 as the indicator organism. Although histamine had very little effect on the genotoxicity of these mutagens, the other amines reduced genotoxicity, with tryptamine and 5-hydroxytryptamine exerting the greatest effect. Generally the amines exhibited greater potency when S-9 fractions from mice rather than from hamsters were used. AS

Bacteria

Staphylococcus aureus

- 733 Bennett (RW) and Berry (MRJr). Serological reactivity and in vivo toxicity of *Staphylococcus aureus* enterotoxins A and D in selected canned foods. *Journal of Food Science* 52(2); 1987; 416-418

In order to study the serological and biological activities during simulated commercial canning *Staphylococcal* enterotoxins A (SEA) and D (SED) were added to infant formula and to cream of celery soup. When both food products were retorted at 123.9 °C with sterilization values (F_0) of approx. 3 and 8 the enterotoxins were found to be reduced or inactivated serologically but were found to be biologically active when injected into kittens. It is thus seen that SEA and SED remain active under some canning conditions and are found to be potential health hazards. NGKR

Morpholine oleic acid

- 734 Shibata (MA), Kurata (Y), Ogiso (T), Tamano (S), Fukushima (S) and Ito (N). Combined chronic toxicity and carcinogenicity studies of morpholine oleic acid salt in B6C3F₁ mice. *Food and Chemical Toxicology* 25(8); 1987; 569-574

Effects of administration of morpholine as a fatty acid, morpholine oleic acid and salt (MOAS) in mice were studied to establish its toxic and carcinogenic potential. MVG

Mycotoxins

Aflatoxins

- 735 Mutluer (B) and Erkoç (U). Effects of gamma irradiation on aflatoxins. *Zeitschrift für Lebensmittel-Untersuchung und -Forschung* 185(5); 1987; 398-401

FOOD LAWS AND REGULATIONS

- 36 Flowerdew (DW). Legislative aspects of smoked foods. IFST Proceedings 19(2); 1986; 79-81

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GENERAL

- 737 Anon. Food trends in the 1990s. *Food Manufacture* 62(9); 1987; 61-63
- 738 Bone (B). The importance of consumer language in developing product concepts. *Food Technology* 41(11); 1987; 58, 60, 86
- 739 Marlowe (P). Qualitative research as a tool for product development. *Food Technology* 41(11); 1987; 74, 76, 78

Focus groups and other qualitative techniques can be used for gathering consumer information. BV

•FOOD PROCESSING

- 740 Kurz (M). Infra red roasting of seed kernels. Part 2. *Food Trade Review* 57(5); 1987; 8-9, 12

Briefly discusses moisture removal by infra red roasting; roasting effect on aroma, colour and flavour, storage quality and shelf life, blanching quality and reduction of bacteria on the surface. BV

FOOD PACKAGING

Packaging materials

- 741 Montanari (A), Milanese (G) and Cassara (A). Application of impedance measurements in the study of problems concerning metal packages. Part I. *Industria Conserve* 62(2); 1987; 105-118 (It).

Presents the electrochemical impedance technique to the evaluation of the protective efficiency of different types of lacquers on the welded side seams of cans intended for beverages. BV

FOOD ENGINEERING AND EQUIPMENT

Engineering

- 742 Hallstrom (B) and Tragardh (C). Mathematical modelling in food engineering research. *Acta Alimentaria* 16(3); 1987; 239-248

- 743 Lacroix (C) and Castaigne (F). Simple method for freezing time calculations for infinite flat slabs, infinite cylinders and spheres. **Canadian Institute of Food Science and Technology Journal** 20(4); 1987; 252-259

A simple model is proposed to estimate freezing times of foodstuffs of simple shapes (infinite flat slabs, infinite cylinders and spheres). This model combines Plank's equation for the phase change period with unsteady state heat transfer solutions for the cooling periods before and after phase change. The total freezing time is obtained by the detn. and the summation of the pre-cooling, phase change and tempering times. The results produced are at least as accurate as, or better than, any of the previous methods, including regression formulae and finite difference computations. All calculations are easily programmable on scientific calculators such as HP 41 C, allowing simple, fast and accurate prediction of freezing times of foodstuffs. AS

- 744 Taoukis (P), Davis (EA), Davis (HT), Gordon (J) and Talmon (Y). Mathematical modelling of microwave thawing by the modified isotherm migration method. **Journal of Food Science** 52(2); 1987; 455-463

A mathematical model of microwave thawing of homogeneous food products is developed and solved numerically using the Modified Isotherm Migration Method. The model is used to predict thawing time and temp. profiles for microwave thawed meat cylinders at three frequencies (2450 MHz, 915 MHz, 300 MHz) and different power levels. The advantage of using 915 or 300 MHz power over 2450 MHz power is shown by calculations. The results show that microwaves significantly accelerate the thawing rate. The mathematical model is explored as a tool for designing optimal microwave/convective heating protocols for rapidly thawing foods in desired temp. ranges. AS

Drying

- 745 Radajewski (W), Jolly (P) and Abawi (GY). Optimization of solar grain drying in a continuous flow dryer. **Industria Conserve** 38(2); 1987; 127-144

The optimum method of using a solar air collector combined with a grain drying system was investigated. Two types of solar collectors, integrated into a roof are considered; one uncovered (flow under absorber) and one covered (flow over absorber). A computer model was developed to minimise the cost of drying and in doing so optimize the geometry of the collector and the specific rate of air flow through the collector. The ratio of the cost of drying in a solar-supplemented system to the cost of drying in a conventional system was minimized. This ratio represents the max. possible savings for the given drying conditions. Sensitivity analyses were carried out for drying air temp. in the range 40 to 90 °C and for grain initial moisture contents of 16 to 35% d.b. (dry basis). The effect of daily drying times, the length of the drying season and the specific cost of collector and fuel was also investigated. The results show that there is an optimum number of hours of operation per day, optimum drying

temp. and optimum initial moisture content for any combination of the other variables. The most critical factors affecting annual savings are the length of the drying season and the specific cost of the collector. The optimum geometry of the collector and the specific flow rate are also functions of these factors. AS

Equipments

- 746 Anon. Depositing and coating: The race to stay ahead. **Food Manufacture** 62(9); 1987; 25, 27, 28

Equipment available for the various forms of depositing and coating is described. BV

- 747 van de Voort (FR), Laureano (M), Smith (JP) and Raghavan (GSV). A practical thermocouple for temp. measurement in microwave ovens. **Canadian Institute of Food Science and Technology Journal** 20(4); 1987; 279-284

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

Chemistry (Analytical)

- 748 Colling (M) and Wolfram (G). Determination of purine compounds and purine bases in food. **Zeitschrift fur Lebensmittel-Untersuchung und -Forschung** 185(4); 1987; 288-291 (De).

The total purine content and the content of RNA, DNA, nucleotides, nucleosides and free purine bases has been determined in commercial raw food. The content of nucleic acids is especially high in veal, pork and beef. In these samples the quantity of purine bound in nucleotides, nucleosides, and bases is very small. In trout and herring, more purine is bound in RNA and DNA. The same is true of roe, pork and beef muscle. Peas and beans have the lowest total purine content of all the samples examined. BV

- 749 Kissinger (PT) and Pachla (A). Determination of ascorbic acid and dehydroascorbic acid using liquid chromatography with ultraviolet and electrochemical detection. **Food Technology** 41(11); 1987; 108-111
- 750 Miertus (S), Vojtekova (H), Svorc (J) and Sturdik (E). Determination of mutagenic compounds in food using a specific biological systems. **Acta Alimentaria** 16(3); 1987; 231-237

We have used SOS inducing potency of genetically manipulated bacteria *E. coli* for the identification and detn. of mutagenic compounds in foods. Basic analytical parameters of the method, namely

linearly range, threshold value of detection and sensitivity were determined. Comparing analytical parameters such as threshold value of detection and sensitivity with those of classical analytical methods used up to date, we found a similar quality of both approaches. Main advantage of the presented bioanalytical method is the possibility of direct analysis of true samples of food without previous separation. This has been demonstrated by detn. of 5-nitrourylacrylic acid in wine and nitrovin in chicken liver. AS

- 751 Newsome (WH) and Collins (PG). Enzyme-linked immunosorbent assay of benomyl and thiabendazole in some foods. **Journal of the Association of Official Analytical Chemists** 70(6); 1987; 1025-1027

Enzyme-linked immunosorbent assays were developed for benomyl as its decomposition product, methyl 2-benzimidazole carbamate, and thiabendazole in foods. Immunogens consisting of human serum albumin coupled to 2-succinamidobenzimidazole or 2-(2'-succinamido-4'-thiazoly) benzimidazole were used in rabbits to raise antisera that were specific for the respective fungicides. Lower limits of quantitation of 0.35 p.p.m for benomyl and 0.03 p.p.m for thiabendazole were established without cleanup of the ethyl acetate extract. Recoveries of benomyl from 3 crops spiked at 0.5 to 10 p.p.m averaged 89% (range 73-109%) and of thiabendazole from 5 crops spiked at 0.1 to 2.0 p.p.m were 93% (range 81-105%). AS

- 752 Osborne (B G). Determination of potassium bromate in flour by flow injection analysis. **Analyst** 112(2); 1987; 137-139

- 753 Pensabene (JW), Doerr (RC) and Fiddler (W). Determination by liquid chromatography with electrochemical detection of cysteamine and cysteine, possible precursors of N-nitrosothiozolidine. **Journal of the Association of Official Analytical Chemists** 70(6); 1987; 1033-1035

Using a gold/mercury electrode a selective rapid and accurate method for detn. of low concn. of cysteamine and cysteine in meat products has been developed and described. MVG

- 754 Pick (FE), De Beer (PR), Prinsloo (SM) and Van Dyk (LP). Contaminant and formulation analysis of MSMA using high-pressure liquid chromatography-graphite furnace atomic absorption spectrophotometry. **Pesticide Science** 21(1); 1987; 45-49

Commercial formulations of sodium hydrogen methylarsenate (MSMA) have been analysed for contaminants like arsenite or arsenate salts or dimethyl arsenic acid using HPLC with an ion exchange column combined with graphite furnace atomic absorption spectrophotometry. The results revealed no contamination with the above compounds and the MSMA concn. conformed to the concn. stipulated on the containers. NGKR

- 755 Stroup (WH), Peeler (TT) and Smith (K). Evaluation of precision estimates for fiber-dimensional and electrical hygrometers for water activity determinations. **Journal of the Association of Official Analytical Chemists** 70(6); 1987; 955-957

The precision estimates for a fiber-dimensional hygrometer was determined in an unsufficient number of laboratories and the estimates for this hygrometer was compared with those for selected electrical hygrometer. MVG

- 756 Worobey (BL) and Shields (JB). Determination of naptalam and its metabolite in foods as 1-naphthylamine, using liquid chromatogrpahy with oxidative electrochemical detection. *Journal of the Association of Official Analytical Chemists* 70(6); 1987; 1021-1024

FOOD MICROBIOLOGY AND HYGIENE

- 757 Andrews (WH). Recommendations for preparing test samples for AOAC collaborative studies of microbiological procedures for foods. *Journal of the Association of Official Analytical Chemists* 70(6); 1987; 931-936

Ethyl alcohol

- 758 Juroszek (JR), Raimbault (O), Feuillat (M) and Charpentier (C). A new method for determination of ethanol tolerance in vinification yeast: Measurement of glucose-induced proton movements. *American Journal of Enology and Viticulture* 38(4); 1987; 336-341

Microorganisms

- 759 Mattila (T). Automated turbidometry-A method for enumeration of bacteria in food samples. *Journal of Food Protection* 50(8); 1987; 640-642

Growth parameters of bacteria determined by automated turbidometry to predict the degree of microbial contamination of food supplies-sausages, hamburgers, and French fries was compared with conventional plate counting using the multiple stepwise regression analysis. The results indicate that the bacterial count as determined by the plate count method can be predicted accurately with the Bioscreen analyser by using turbidometric parameters of bacterial growth. The detection time of bacterial growth was considered the most important predictor selected by the stepwise regression analysis. BV

Bacteria

Bacillus

- 760 Quintavalla (S) and Gola (S). Effect of pH and a_w on the growth of *Bacillus* strains in a culture medium. *Industria Conserve* 62(2); 1987; 131-134 (It).

The effects of two acids (citric and o-phosphoric) and two water activity lowering agents (NaCl and glycerol) on the spores of eight *Bacillus* strains, some of which isolated from intermediate-moisture foods (IMF) were investigated. The limiting min pH value for spore germination and outgrowth varied from 4.6 to 5.2 as a function of the

type of acid used and the bacterial strain. The limiting min water ranged between 0.90 and 0.95 depending on the water activity lowering agent and the strain. The four strains isolated from IMF (*B. subtilis*, *B. brevis*, *B. megaterium* and *B. thuringiensis*) proved less sensitive to pH and water activity changes. The combination of the two parameters resulted in an increased limiting value for bacterial growth and gave useful indications about the microbiological stability of pasteurized IMF at room temp. AS

Bacillus stearothermophilus

- 761 Aiba (S), Zhang (M), Ohnishi (M) and Koizumi (J-I). Production of Alpha-amylase in transformant of *Bacillus stearothermophilus* Improvement of recombinant plasmid that can be used at higher temp. *Biotechnology and Bioengineering* 30(8); 1987; 978-982

Clostridium

- 762 Pirone (G), Mannino (S) and Campanini (M). Heat resistance of butyric acid clostridia as a function of pH. *Industria Conserve* 62(2); 1987; 135-137 (It).

Spores of two bacterial strains, one of *Cl. pasteurianum* and the other of *Cl. saccharobutyricum*, were evaluated for their heat resistance in tomato serum as a function of pH and the kind of acid added to adjust the pH. Spore recovery was performed at pH 5.5. Decimal reduction time values (D) decreased with decreasing pH, whereas they were not significantly affected by the kind of acid added. The *Cl. pasteurianum* strain, which proved more heat resistant, showed the following decimal reduction time at 90 °C: 11.6 min at pH 4.5, 7.19 min at pH 4.3, and 6.25 min. at pH 4.1. The Z value was 9.5 °C. Recovery of the *Cl. pasteurianum* spores in tomato serum at pH values 4.5 and 4.3 evidenced a synergistic effect of heat treatment and pH: at pH 4.5 the D value decreased by 45%. AS

Clostridium thermohydrosulfuricum

- 763 Melasniemi (H). Effect of carbon source on production of thermostable Alpha -amylase, pullulanase and Alpha-glucosidase by *Clostridium thermohydrosulfuricum*. *Journal of General Microbiology* 133(4); 1987; 883-890

The production of Alpha -amylase, pullulanase and Alpha-glucosidase activities by *C. thermohydrosulfuricum* is discussed and the effect of the carbon source on the synthesis and localization of these enzymes is examined. MVG

Erwinia carotovora

- 764 Wegener (C) and Henniger (H). Characterization and application possibilities of a pectate lyase from *Erwinia carotovora*. *Nahrung* 31(4); 1987; 297-303 (De).

Escherichia coli

- 765 Poelma (PL), Wilson (CR) and Andrews (WH). Rapid fluorogenic enumeration of *Escherichia coli* in selected, naturally contaminated high moisture foods. *Journal of the Association of Official Analytical Chemists* 70(6); 1987; 991-993

An assay for the enzyme glucuronidase was used to determine the presence of *Escherichia coli* in selected, naturally contaminated high moisture foods. Raw pork, sausage, ground turkey, and ground beef were inoculated into tubes containing the substrate 4-methylumbelliferyl beta-D-glucuronide (MUG) in lauryl tryptose (LT) medium. After incubation at 35 °C for 24 h, the inoculated LT-MUG tubes were examined under longwave ultraviolet light for the presence of a fluorogenic glucuronidase end product. A fluorescing tube indicated the presumptive presence of *E. coli*. The 10 day most probable number method of the AOAC and the LT-MUG procedure gave comparable recoveries of *E. coli*. AS

Leuconostoc mesenteroides

- 766 Otts (DR) and Day (DF). Optimization of protoplast formation and regeneration in *Leuconostoc mesenteroides*. *Applied and Environmental Microbiology* 53(7); 1987; 1694-1695

Salmonella

- 767 De Smedt (JM) and Bodlerdijk (RF). Dynamics of *Salmonella* isolation with modified semi solid Rappaport-Vassiliadis medium. *Journal of Food Protection* 50(8); 1987; 658-661

Streptococcus cremoris

- 768 Exterkate (FA) and de Veer (GJCM). Efficient implementation of consecutive reactions by peptidases at the periphery of the *Streptococcus cremoris* membrane. *Applied and Environmental Microbiology* 53(7); 1987; 1482-1486

Fungi

Aspergillus niger

- 769 Elshafei (AM). New Pathway for D-glucose degradation in *Aspergillus niger*. *Chemie Mikrobiologie Technologie der Lebensmittel* 11(1); 1987; 18-20 (De).
- 770 Tahoun (MK), El-Kadey (MF) and Wahba (AA). Hydrolysis of synthetic and natural triglycerides by an intracellular lipase from *Aspergillus niger*. *FAT Science and Technology* 89(7); 1987; 261-263

An intracellular lipase was isolated from *Aspergillus niger* and the enzyme was purified by gel filtration chromatography on Sephadex G 75 column. The purified enzyme was found to be homogeneous as judged by electrophoresis on polyacrylamide gels. The specificity of the

lipase towards single fatty acid triacylglycerols and natural triglycerides was determined. The enzyme preferentially attacks tripalmitoylglycerol as compared to other triglycerides. Positional specificity on using milk fat and olive oil triglycerides showed that the enzyme attacks positions 1 and 3 in triglyceride molecules. AS

- 771 Zyla (K). The influence of thermal treatment on a commercial preparate of *Aspergillus niger* glucoamylase. *Nahrung* 31(4); 1987; 349-351

Rhizopus stolonifer

- 772 Hornewer (A), Nguyen-The (C), Nicolas (J) and Souty (M). Purification of *Rhizopus stolonifer* polygalacturonase. *Sciences des Aliments* 7(2); 1987; 361-379 (Fr).

Yeasts

- 773 Goto (S), Iwasaki (H), Okuma (Y), Ito (Y) and Endo (A). New species belonging to the genera *Pichia* and *Candida*. *Journal of General and Applied Microbiology* 33(3); 1987; 275-286

Six ethanol using yeasts with acid and ethanol tolerance isolated from soils and feces were subjected to detailed taxonomic studies. One strain 1M-10 which has helmet shaped ascospores, was concluded as a new species, *Pichia galeiformis*. Five other anascosporegenus yeasts with coenzymes Q-7 were derived into three new species belonging to the genus *Candida*, *C. hinsensis* three of *C. soli* and one of *C. solicola*. MVG

Candida guilliermondii

- 774 Halasz (A), Ali Muayad (A) and Matrai (B). The effect of oxygen absorption rate (aeration rate) on the methionine content, protein content and growth rate of some methionine rich mutants of *Candida guilliermondii* 812. *Acta Alimentaria* 16(3); 1987; 249-262

Strains of yeast selected from successive UV light treatments of *Candida guilliermondii* 812 were used. Selection was carried out according to the methionine, protein and nucleic acid content. All fermentations were carried out under similar environmental conditions using synthetic media supplemented with 2% glucose and 0.5% yeast extract. The only altered cultivation conditions was the aeration rates. Different fermentors were used with aeration rates between 60-1250 $\text{dm}^{-3} \text{h}^{-1} \text{dm}^{-3}$, corresponding to oxygen absorption rates of 20-208 $\text{mmol oxygen dm}^{-3} \text{h}^{-1}$. The study showed that the aeration rate does effect the methionine content of the yeast biomass, in addition to its known effect on the growth rate. Protein content did not show any significant changes. AS

Zymomonas mobilis

- 775 Afendra (AS) and Draninas (C). Expression and stability of a recombinant plasmid in *Zymomonas mobilis* and *Escherichia coli*. *Journal of General Microbiology* 133(1); 1987; 127-134

The transfer, expression and stability of the recombinant plasmid in *Z. mobilis* and is described and it is proposed that this may be used as a suitable shuttle cloning vector for the development of a high-efficiency transfer system in this organism. MVG

- 776 Osman (YA) and Ingram (LO). *Zymomonas mobilis* mutants with an increased rate of alcohol production. *Applied and Environmental Microbiology* 53(7); 1987; 1425-1432

Two new derivatives of *Zymomonas mobilis* CP 4 were isolated from enrichment cultures after 18 months of serial transfers. These were found to be superior to the parent strain with respect to speed and completeness of glucose conversion to ethanol. Addition of 1mM magnesium sulphate improved ethanol production as fermentation proceeded. In both the new strains altered alcohol dehydrogenase isoenzymes and no longer catalysed the oxidation of allyl alcohol into toxic products, acrolein. This property is proposed as a primary factor contributing to increased allyl alcohol resistance though certain other mutations affecting glycolysis may also contribute to the improvement of ethanol production. MVG

BIOTECHNOLOGY

- 777 Berger (RG), Neuhaeuser (K) and Drawert (F). Biotechnological production of flavour compounds. III. High productivity fermentation of volatile flavours using a strain of *Ischnoderma benzoinum*. *Biotechnology and Bioengineering* 30(8); 1987; 987-990

TISSUE CULTURE

Nil

FOOD ADDITIVES

- 778 Cruz (JR) and Valle (MLJD). Surface active agents as food additives. *Crasas Y Aceites* 38(1); 1987; 39-44

This report reviews the main surface active agents, principally fat derivatives, used as food additives, their preparation, properties and applications. BV

Colorants

Caramel

- 779 Hardt (R) and Baltes (W). The analysis of caramel colours. Part 1. Differentiation of the classes of caramel colours by Curie-point pyrolysis-capillary gas chromatography-mass spectrometry. *Zeitschrift für*

Lebensmittel-Untersuchung und -Forschung 185(4); 1987; 275-280

Reports on the examination of caramel colours by Curie-point pyrolysis-capillary gas chromatography-mass spectrometry. This method enables the differentiation between the four classes of caramel colours on the basis of the most concentrated of more than 100 identified pyrolysis products, which required small quantities of substance (100 μ g) and short period of time (1h). BV

Preservatives

- 780 Abdel-Bar (N), Harris (ND) and Rill (RL). Purification and properties of an antimicrobial substance produced by *Lactobacillus bulgaricus*. *Journal of Food Science* 52(2); 1987; 411-415

This study was designed to further purify and more completely characterise antimicrobial substances produced in cultures of this organism by more sophisticated techniques (*Lactobacillus bulgaricus*). The results of the study on the media taken from cultures of the above organism were found to contain an antibiotic substance different from lactic acid and this antibiotic substance was found to be active against *Pseudomonas fragi* and to a lesser extent *Staphylococcus aureus* and the optimum pH for a activity was approx. 4.0 where its activity was stable at 6 °C for 18 days and for about 1 h at 100 °C. This substance after purification was found to be an aromatic moiety with mole. wt. less than or equal to 700 by UV and MS studies. NGKR

Stabilizers**Gells****Pectins**

- 781 Kunzek (H), Kleiber (U), Leps (C) and Schmidt (M). About the analytic weighting of pectin solutions and fluid pectin products. *Lebensmittel-industrie* 34(1); 1987; 15-19 (De).

The suitability of pectin solutions as gelling agent is determined by the pectin content, the pectin quality and by type and amount of accompanying materials. Strongly increased values of the content of raw pectin-compared with the content of dry pectin hint at a portion of quality-reducing polymer accompanying materials or of low-molecular pectins above average. The degrees are to be valued as measure of the pectin quality. They must correspond with each other in qualitative products, if examined by isolated dry pectin or by direct application of the pectin solution for cooking of jelly. All indices which are analyzed by the content of dry pectin can serve as arbitration values, but the data of the refractometric dry substance can be used as orienting values, only. AS

Sweeteners

Cyclamates

- 782 Greve (H) and Bonifer (P). Experiences on a determination method for cyclamate. *Flussiges Obst* 54(7); 1987; 382-385 (De).

A method is described based on the original instruction of Dolan Hoo and Chu-Chuan Hu and which makes it possible to determine quantitatively cyclohexyl sulfamine acid within a short time and with little amount of equipment. The detn. was carried out in various dietetic beverages, saccharin solutions and dietetic jams. BV

CEREALS

- 783 Chelkowski (J), Samson (RA), Wiewiorowska (M) and Golinski (P). Ochratoxin A formation by isolated strains of the conidial stage of *Aspergillus glaucus* Link ex Grey (= *Eurotium herbariorum* Wiggers Link ex Grey) from cereal grains. *Nahrung* 31(4); 1987; 267-269 (De).

Two strains of *Aspergillus glaucus* Link ex Grey (= *Eurotium herbariorum* Wiggers Link ex Grey) out of 15 isolated from cereals formed ochratoxin A during growth on autoclaved kernels of wheat and corn, with yields from 0.8 to 2.5 mg/kg of culture. AS

- 784 Dong (FM) and Rasco (BA). The neutral detergent fiber, acid detergent fiber, crude fiber, and lignin contents of distillers' dried grains with solubles. *Journal of Food Science* 52(2); 1987; 403-405, 410

This investigation was carried out to study the quality characteristics of fibre obtained from distillers dried grains with solubles (DDGS) produced from var. of wheat, corn and wheat products, to examine the effect of sulphite addition to the detergent solution used in the neutral detergent fiber assay and also compare the caloric contents of the DDGS and the raw material used. The results of assay showed that DDGS solubles made from different raw material sources contained on a dry wt. basis 30-55% neutral detergent fiber, 10-14% acid detergent fibre and 2-4% lignin, an increase of 3-4 times over that contained in the unconverted whole grains. The significantly higher concn. of DDGS NDF isolated without sodium sulphite in the detergent solution was not due entirely to increased levels of residual protein. NGKR

- 785 Henry (RJ). Pentosan and (1 → 3), (1 → 4) -Beta-glucan concentrations in endosperm and wholegrain of wheat, barley, oats and rye. *Journal of Cereal Science* 6(3); 1987; 253-258

The major cereal dietary fibre components, pentosans and (1 → 3), (1 → 4)-Beta-glucans were measured in whole grains of two var. each of wheat, barley, oats and rye and in the endosperms from these grains. These analyses were applied directly to the grain without

prior isolation of a fibre fraction. Pentosan and Beta-glucan levels were much higher in the whole grain than in the endosperm except in barley in which the Beta-glucan was present in similar concn. in whole grain and endosperm. Mean whole grain pentosan levels (dry wt. basis) for the two var. of each grain type analysed in this study were: wheat, 6.6%; barley, 6.6%; oats, 5.8% and rye 9.0%. Corresponding values for the endosperm were 2.3%, 1.4%, 0.7% and 3.9%, resp. Beta-glucan content of whole wheat was 0.6%; barley, 4.2%, oats, 3.9% and rye 2.5%. The respective endosperm values were 0.3, 4.1, 1.8 and 1.7%. The pentosan from the whole grain contained more xylose than that from the endosperm. AS

- 786 Jasvinder Kaur, Usha Mirgai and Bajaj (S). Microbiological evaluation of cereal protein. *Journal of the Science of Food and Agriculture* 40(2); 1987; 145-150

The protein quality of 23 wheat var., 10 rice var. and 7 triticale var. was microbiologically evaluated using *Tetra-hymena pyriformis* W. The results showed that wheat var. CBW 12, CBW 392, CBW 396 and 306, the rice var. Jaya and PR 228 and the triticale var. TC 174 and TCB 692 were found to be nutritionally best. The relative nutritive value showed a positive correlation with lysine for wheat, rice and triticale and these values for wheat, rice and triticale were found to be quite close to the reported net protein utilisation values. NGKR

- 787 McCleary (BV) and Sheehan (H). Measurement of cereal Alpha amylase: a new assay procedure. *Journal of Cereal Science* 6(3); 1987; 237-251

A new procedure for the assay of cereal Alpha amylase has been developed. The substrate is a defined maltosaccharide with an Alpha linked nitrophenyl group at the reducing end of the chain, and a chemical blocking group at the non-reducing end. The substrate is completely resistant to attack by Beta amylase, glucoamylase and Alpha-glucosidase and thus forms the basis of highly specific assay for Alpha amylase. The reaction mixture is composed of the substrate plus excess quantities of Alpha-glucosidase and glucoamylase nitrophenyl-maltosaccharides released on action of Alpha amylase are instantaneously cleaved to glucose plus free P-nitrophenol by the glucoamylase and Alpha-glucosidase, such that the rate of release of P-nitrophenol directly correlates with Alpha-amylase activity. The assay procedure shows an excellent correlation with the Farrand, the Falling Number and the Phadebas Alpha-amylase assay procedures. AS

Oats

- 788 Harwalkar (VR) and Ma (C-Y). Study of thermal properties of oat globulin by differential scanning calorimetry. *Journal of Food Science* 52(2); 1987; 394-398

The thermal behavior of oat globulin was studied by differential scanning calorimetry (DSC). The effects of pH, salts, and of various structure perturbants upon thermal characteristics were determined. Raising or lowering pH from near neutrality reduced denaturation temp.

(T_d), enthalpy (ΔH) and cooperativity indicated by increase in width at half height ($\Delta T_{1/2}$). The effect of salts on thermal stability was related to their position in the lyotropic series and suggests involvement of hydrophobic interaction in the thermal stability of oat globulin. Increasing concn. of urea progressively lowered T_d and ΔH and increased $\Delta T_{1/2}$; sodium dodecyl sulphate (SDS) lowered ΔH without affecting T_d ; ethylene glycol (EC) lowered T_d without changing ΔH . Dithiothreitol did not affect DSC characteristics suggesting that disulphide bonds do not contribute to the thermal response of oat globulin. AS

Triticales

- 789 Field (JM) and Shewry (PR). Prolamin subunit interactions in hexaploid and octaploid triticales and their wheat and rye parents. *Journal of Cereal Science* 6(3); 1987; 199-210

The interactions of prolamin subunits encoded by the genomes of wheat (gliadins, glutenins) and rye (secalins) in hexaploid and octaploid triticales were studied by electrophoresis of fractions extracted sequentially from ground grain and fractions prepared by gel filtration chromatography of isolated glutens. The electrophoretic studies indicated that the two groups of polymeric secalins (the high-mol. wt. (HMW) secalins and 75 K Gamma-secalins) and wheat glutenin subunits form at least some mixed polymers and oligomers that have solubility properties intermediate between those found by the same subunits in the parental lines of wheat and rye. The gel filtration studies showed that the 75 K Gamma-secalins are mainly present in low mol.-wt. (LMW) polymers, but there were no major difference between the elution profiles of the glutens from triticales and the parental wheat lines. It is concluded that attempts to increase the protein content of wheat by the transfer of genes for 75 K Gamma-secalins from chromosome 2R of rye might have deleterious effects on breadmaking and other technological properties. AS

- 790 Khan (MA) and Rashid (J). Nutritional quality and technological value of triticales. *ASEAN Food Journal* 3(1); 1987; 17-20

The present study investigates the nutritional quality of triticales in comparison with other cereal grains and its technological value with wheat. The protein content (14.1%), lysine concn. (2.9 g/16 g N), fat, crude fibre, ash, Ca, P and tannin content in triticales were higher than other cereals, whereas available carbohydrates and Fe levels were lower than wheat. The values for true protein digestibility (TD), biological value (BV) and net protein utilization (NPU) of triticales were 93, 66 and 61% resp. The NPU of triticales was higher than other cereals. Brabender Farinograph and Chopin Alveograph tests indicated that triticales flour had higher water absorption but lower stability, extensibility and strength as compared to wheat flour. The triticales chapati was darker in colour and tougher in texture than wheat chapati. The data indicate that the quality and quantity of the triticales protein is superior to many cereals and can partly replace wheat flour without impairing the baking quality of the chapati. BV

Wheat

- 791 Bengston (M), Desmarchelier (JM), Hayward (B), Ronald (H), Moulden (JH), Noble (RM), Smith (G), Snelson (JT), Sticka (R), Thomas (D), Wallbank (BE) and Webley (DJ). Synergised cyfluthrin and cypermethrin as grain protectants on bulk wheat. *Pesticide Science* 21(1); 1987; 23-27

Treatment of bulk wheat in commercial silos with cyfluthrin (2 mg/kg^{-1}) plus piperonyl butoxide (10 mg/kg^{-1}) and cypermethrin (4 mg/kg^{-1}) plus piperonyl butoxide (10 mg/kg^{-1}) and laboratory bioassay on samples of treated grain using malathion resistant strains of insects established that the treatments were found to be generally effective in controlling two strains of *Sitophilus oryzae* L. Both combinations were effective against *Rhyzopertha dominica* F., *Tribolium castaneum* Herbst and *Ephestia cautella* Walker and no natural infestation was reported. The mean residues of cyfluthrin and cypermethrin after 9 months storage were reported to be 58% and 52% of the calculated application rates resp. Residues were higher in brown than in the white flour and after baking residues decreased by upto 29%. But alternate formulations are suggested in order to avoid respiratory irritation due to exposure to above combinations by the operators. NGKR

- 792 Every (D). A simple four-minute, protein-solubility test for heat damage in wheat. *Journal of Cereal Science* 6(3); 1987; 225-236

A simple 4 min test for heat-damaged wheat has been developed primarily for use by mills at wheat intake. The test is based on the loss of solubility of proetins in heat damaged wheat and use a Coomassie blue G250 staining reagent to measure protein in saline extracts of wholemeal or white flour. Regression of protein solubility on percent heat-damaged wheat resulted in a high coefficient of detn. for wide range of wheat cv. from several countries grown at various localities throughout the world. There appears to be a good linear relationship between the breadbaking quality of heat-damaged wheat (measuring by loaf volume) and the protein solubility test values for heat-damaged wheat. Bug-damaged wheat, sprout-damaged wheat, fungus-infected wheat and wheat of high or low protein content had value in the protein solubility test corresponding to sound wheats, that is, they did not give a false prediction of heat damage. AS

- 793 Hakansson (B), Jagerstad (M), Oste (R), Akesson (B) and Jonsoon (L). The effects of various thermal processes on protein quality, vitamins and selenium content in whole-grain wheat and white flour. *Journal of Cereal Science* 6(3); 1987; 269-282

Whole-grain wheat and white flour from wheat were subjected to var. thermal processes-steam flaking, autoclaving, popping, extrusion cooking, and drum drying-under both mild and severe conditions. The effects of processing on protein quality were evaluated (by comparing biological and chemical method), and on retention of vitamins(vitamin E, thiamin and folacin) and selenium. Protein quality was affected most by popping and autoclaving. Changes in biological value correl-

ated significantly ($P < 0.001$) with available lysine measured according to both the fluorodinitrobenzene (FDNB) and the dye-binding procedure. Popping and autoclaving under mild and severe conditions also resulted in the greatest losses of thiamin and folacin. Vitamin E activity, however, was affected most in white flour after extrusion cooking and drum-drying, which destroyed the major part of the vitamin E activity. Selenium retention was practically unaffected by the various thermal processes, except by drum-drying, which caused a 24% loss. No thermal process equally preserved protein quality and process-sensitive vitamins. However, the low temp. processes, like steam flaking and drum-drying or the high temp. short time process extrusion cooking, generally, with the exception of vitamin E, retained the nutrient quality better than popping and autoclaving. AS

- 794 Posner (ES). Wheat temper time reduced by fissuring. *Cereal Foods World* 32(12); 1987; 886-887, 890-891

Fissuring of wheat was done with a pair of smooth rolls with 1:1 differential. No significant difference in milling or baking properties were found between fissured and nonfissured Yecora Rojo wheat and wheat blends when tempered to optimum moisture by cold and hot procedures. Fissured wheat tempered from 8.5 to 16% moisture within 12 h, which reduced tempering time to one-half or less, and gave comparable milling results to those achieved with normal commercial tempering procedures. AS

- 795 Singh (PP), Bedi (PS) and Singh (D). Use of organic acids for protecting moist wheat grains from microbial colonization during storage. *Journal of Stored Products Research* 23(3); 1987; 169-171

The results of an evaluation of the effect of treating moist wheat grains with different organic acids before storage and the incidence of aflatoxin-producing isolates of *Aspergillus flavus* in the stored grains have been reported in this paper. The results showed that when moist wheat grains (18% W/V) were treated with a 40:40:20 mixture of organic acids (acetic:propionic:butyric) and propionic acid alone at 1.5 and 5.0% concn., 1.5% concn. was ineffective and 5% concn. protected them from various fungi for the first 6 months of storage and later gradually decreased. The aflatoxin producing isolates of *Aspergillus flavus* on the stored grains was not affected by any of the acid treatments. NGKR

Wheat bran

- 796 Oakenfull (DG) and Topping (DL). The nutritional value of wheat bran. *Food Technology in Australia* 39(6); 1987; 288-292

Wheat proteins

- 797 Baldo (BA) and Lee (JW). Lectins as cytochemical probes of the developing wheat grain. VII. Ultrastructural location of protein bodies and nucellar epidermis with lectin-gold complexes. *Journal of Cereal Science* 6(3); 1987; 211-218

- 798 Downey (G) and Byrne (S). Protein determination of wheat in trade by near infrared reflectance spectroscopy. Calibration and instrument performance over a four year period. *Sciences des Aliments* 7(2); 1987; 325-336
- 799 Uhlen (AK) and Ringlund (K). Gene dosage effects on storage proteins in wheat *Triticum aestivum*. *Journal of Cereal Science* 6(3); 1987; 219-223

The storage proteins of F1 and F2 seeds of wheat were characterised in terms of their high-mol.-wt. (HMW) glutenin subunits by SDS-polyacrylamide gel electrophoresis. It was possible to distinguish between haploid, diploid and triploid gene dosage effects on these endosperm proteins. A novel, minor HMW subunit of glutenin associated with band 2* was identified. AS

MILLETS

- 800 Bookwalter (GN), Lyle (SA) and Warner (K). Millet processing for improved stability and nutritional quality without functionality changes. *Journal of Food Science* 52(2); 1987; 399-402

In this investigation studies were conducted on processing of whole millet grain to inactivate deleterious lipid enzymes without changing functionality in order to retain stabilized germ-fractions and increased nutritional quality. Whole millet adjusted to 15% moisture was gradually heated to 97 °C over 12 min by passing through a steam jacketted paddle convey or to inactivate lipid enzymes. The results of experiments on the milled flours obtained from both processed and unprocessed millets milled to 50% and 80% extractions showed that 80% flour had more nutritive value than 50% flour. After storage at 49 °C peroxide and fat acidity values were found to be lower and flavour quality higher for processed flours than unprocessed flours. However no differences were observed in the rheological properties and their use in the several traditional foods. NGKR

Corn

- 801 Subramanyam (B), Cutkomp (LK) and Kouable (B). Effect of short-term feeding by adults of *Prostephanus truncatus* (Horn) (Coleoptera: Bostrichidae) on shelled maize. *Journal of Stored Products Research* 23(3); 1987; 151-155

Laboratory experiments on the damage caused by adults *P. truncatus* feeding on shelled maize were carried out to determine the damage to endosperm, germ, or endosperm and germ due to adult feeding for 10, 20, 30 and 40 days to determine the effect of short-term (10-40 days) adult feeding on kernel damage, wt. loss and germination and to determine the influence of temp. on kernel damage, wt. loss and wt. of maize flour produced as a result of adult feeding. Results showed that adult survival during the 40 days period decreased linearly with time at the rate of 1.5 and 1.3% of adults/day at adult densities of

50 and 100 resp. The results suggest that a short period of adult feeding could result in substantial grain damage. NGKR

Finger millets

- 802 Venkanna Babu (B), Ramana (T) and Radhakrishnan (TM). Chemical composition and protein content in hybrid varieties of finger millet. *Indian Journal of Agricultural Sciences* 57(7); 1987; 520-522

Six hybrid var. (VR 250-6, VZM 1, VZM 2, C 157, APK 2 and Godavari) of finger millet (*Eleusine coracana* (Linn.) Gaerth.) showed no variation in ash and N content. The concn. of P, Ca and Cu were more in VZM 1; VR 250-6 contained highest Fe. Protein content (N x 6.25) ranged from 8.0 in Godavari to 12.1% in C 157. Glutelins and prolamines were found as major proteins in all the hybrids, C 157 had max. glutelins of 6.6%. KAR

Sorghum

- 803 Galiba (M), Rooney (LW), Waniska (RD) and Miller (FR). The preparation of sorghum and millet couscous in West Africa. *Cereal Foods World* 32(12); 1987; 878-880, 882-884

This article reviews the current status of couscous (a steamed food prepared from sorghum and millet in the Sahel) preparation from cereals other than wheat and studies some of the parameters affecting couscous quality from sorghum and pearl millet. Data on couscous quality of sorghum and pearl millet in West Africa indicated relatively little differences in yields of couscous from the same amount of mechanically milled flour. The major factor affecting couscous yield was milling yield. The more the milling yield the more was the couscous yield. Particle size distribution of mechanically milled flour affected the amount of water required for agglomeration but did not affect the yield of couscous. Pearl millet had poor decortication properties and a significantly higher extent of starch gelatinization in couscous. Couscous prepared from pearl millet was darker in colour. BV

PULSES

- 804 Ofuya (TI). Susceptibility of some *Vigna* species to infestation and damage by *Callosobruchus maculatus* (Fabricius) (Coleoptera: Bruchidae). *Journal of Stored Products Research* 23(3); 1987; 137-138

Laboratory experiments were carried out to compare the susceptibility to attack by *Callosobruchus maculatus* (F) on seven *vigna* species. The results showed that two of the species, *V. adenantha* and *V. luteola* were not damaged by the pest but two species *V. oblongifolia* and *V. racemosa* showed relatively low levels of damage whereas the *V. unguiculata* was the most badly affected. NGKR

- 805 Prakash (D) and Misra (PS). Protein and amino acid composition of some wild leguminous seeds. *Qualitas Plantarum - Plant Foods for Human Nutrition* 37(1); 1987; 29-32

The seeds of plants such as *Acacia auriculiformis*, *A. coriacea*, *A. farnesiana*, *A. mellifera*, *A. minbassai*, *A. nilotica*, *Albizia lebbek*, *A. lucider*, *A. richardiana*, *Erythrina fusca*, *E. indica*, *Mucuna prurita* and *M. monosperma* may stand promise as human food after proper processing. In the present study their protein contents and amino acids composition is reported which are comparable to a popular food legume *Cicer arietinum*. BV

Brown beans

- 806 Abbey (BW) and Ibeh (GO). Functional-properties of raw and heat processed brown bean (*Canavalia rosea* DC) flour. *Journal of Food Science* 52(2); 1987; 406-408

The proximate composition of the beans and the functional properties of the raw and heat processed flour from the seeds of the brown bean (*Canavalia rosea* DC) were investigated and the results of analysis showed that brown bean flour had good water and oil absorption but poor gelation properties and had 27.1 g/100g dry wt. crude protein and 7.6 g/100g DW ether extractives. It has also been shown that the solubility of the brown bean protein was minimal at pH 4.0 but increased at pH 10. The foaming capacity of the flour could be improved by increasing concn. as well as by adding NaCl and was influenced by pH whereas the emulsion capacity was dependent on pH and salt concn. The heat processing was found to reduce the foamability and emulsification capacity of the brown bean flour. NGKR

Faba beans

- 807 Weck (M), Hanefeld (M), Schubert (E), Weiss (P), Gerisch (S), Robowsky (K-D) and Noack (R). Cross-over study of faba-bean protein diet and HLP diet with hypercholesterolemic patients. *Nahrung* 31(7); 1987; 759-762 (De).

Green beans

- 808 Steele (RJ). Effect of can rotation during retorting on retention of colour in canned green beans. *CSIRO Food Research Quarterly* 47(2); 1987; 25-29

Describes heat penetration experiments on canned green beans in which the effects of the fill mass of beans and the rate of spinning of the cans were examined. The effect of processes on the colour of the beans was also examined. Spinning the cans (83 x 90 mm cans at 122 C) during processing increased the rate of heat penetration as measured by f_h and changed the shape of the heat penetration curve. Reducing the ratio of beans to brine from 1.6 to 0.83 reduced the f_h for stationary cans from 4.1 to 2.9 min. Spinning the cans with the low ratio of beans to brine further reduced the f_h from 2.9 to 1.0 min. Beans processed to $F_c = 3.5$ min in spinning cans retained more

of their bright green colour than beans processed to $F_0 = 3.5$ min in stationary cans. The colour differences indicate that the process based on spinning cans converts about 26% of the chlorophyll while 38% of the chlorophyll is converted in the stationary process. BV

Green gram

- 809 Mesallam (AS) and Hamza (MA). Studies on green gram (*Phaseolus aureus*) protein concentrate and flour. *Qualitas Plantarum - Plant Foods for Human Nutrition* 37(1); 1987; 17-27

Green gram (*Phaseolus aureus*) protein isolate (GPI) showed presence of 64.04% protein, 1.8% total lipids, 27.64% total carbohydrates, 1.68% crude fibre and 4.84% ash. Fe, Ca, Mg, Cu, Zn, K and Na were also determined. The limiting amino acid in the GPI was lysine. In vitro digestibility by pepsin followed the pancreatin was the highest and the lowest was the digestion by pepsin alone. Water absorption, oil absorption, emulsion capacity and nitrogen solubility index of the GPI were 2.26 g/g, 1.24 g/g, 31.4 g/g and 6.8 g/g, resp. Replacing 5 and 10% of the wheat flour with green gram flour improved the mixing properties of dough and produced good acceptable bread. However, the addition of 15% green gram flour weakened the dough and lowered the bread quality. Replacing 2.5, 5 and 7.5% of wheat flour with protein concn., also weakened the mixing properties of the wheat dough and decreased the bread quality. BV

Green peas

- 810 Bottcher (H). Quality changes of green peas (*Pisum sativum* L.) during storage. Part. 2. Nutritional quality. *Nahrung* 31(7); 1987; 723-738 (De).

In test extending over several years the typical changes in the nutritional quality as occur during storage at defined temp. (0...18 C) were determined in dependence on the duration of storage (x in days). Due to the nutrient transfer from the pods to the seeds, a temporary major rise of the dry matter content (DM) is recorded in the latter together with a strongly inhibited reduction of the mono and disaccharide content. Green peas stored without pods show a linear decrease in the DM content, degressively increasing DM losses and a more distinct reduction of saccharides. When stored with the pods, the typical decline of the vitamin C (ascorbic acid + dehydroascorbic acid) changes in the content according to the equation $Y = \text{Alpha } 0 + \text{Beta } 1 e^{-\text{Theta}^x}$ and losses according to $Y = \text{Beta } 1(1 - e^{-\text{Theta}^x})$ goes back, mainly owing to an essentially lower coefficient for C₀. AS

- 811 Bottcher (H). Quality changes of green peas (*Pisum sativum* L.) during storage. Part 1. External and sensoric quality traits. *Nahrung* 31(4); 1987; 271-284 (De).

Peas

- 812 Mosse (J), Huet (J-C) and Baudet (J). Variations in the amino acid composition of pea seeds in relation to their nitrogen content. *Sciences des Aliments* 7(2); 1987; 301-324 (Fr).

OILSEEDS AND NUTS

- 813 Nwokolo (E). Composition and availability of nutrients in some tropical grains and oilseeds. *Nutrition Reports International* 36(3); 1987; 631-640

Composition and availability of nutrients in sorghum, millet, sesame seed and oil bean meals were determined. Phosphorus content was high in all ingredients but calcium was low in sorghum, millet and oil bean seed. Sesame seed meal had significantly higher content and availability of most minerals while millet and oil bean seed meal had low content and availability of many minerals. All feedstuffs had low content of sulphur amino acids. Lysine content which was low in sorghum, millet and sesame seed meal, was high in oil bean seed meal, though the meal had extremely low content of arginine. Availability of amino acids was significantly higher in sesame seed meal than in sorghum, millet or oil bean seed meal. Fatty acid composition of sesame seed and oil bean seed lipids was similar to that of most edible vegetable oils. AS

Almonds

- 814 Abd El Aal (MH), Gomaa (EG) and Karara (HA). Bitter almond, plum and mango kernels as sources of lipids. *FAT Science and Technology* 89(8); 1987; 304-306 (De).

This report summarises the chemical composition of 2 var. of mango and plum kernels and 1 var. of bitter almond kernel. The physico-chemical characteristics of kernel lipids, the different lipid classes of lipids and fatty acid composition of the lipids are also studied. Bitter almonds and plum kernels contained higher amounts of lipids. Hydrocyanic acid was absent in all kernel lipids. Oleic acid was the major fatty acid present in bitter almonds and plum kernel lipids, while mango kernel lipids were rich in stearic and oleic acid. BV

Cashew nuts

- 815 Nagaraja (KV). Protein of high-yielding varieties of cashew (*Anacardium occidentale*). *Qualitas Plantarum - Plant Foods for Human Nutrition* 37(1); 1987; 69-75

Salts (NaCl and KCl) at 250 mM and alkali (NaOH and KOH) at 50 mM concn. extracted proteins from defatted cashew kernel flour to an extent of 54 to 68% and 80% resp. Electrophoresis of salt extracted

proteins both under native and denatured conditions did not reveal any varietal difference. Zn^{++} at 1 mM concn. specifically precipitated the slow moving fraction of cashew proteins. Defatted cashew kernel flour from var. M 76/1 and Tr. 273 Bla had highest (73.14 μ /mg proteins) and lowest (35.98 μ /mg proteins) lysine contents resp. Extraction of protein from defatted kernel flour at pH 4 was almost one-tenth compared to pH 10. Lysine content in protein extracted at pH 10 was highest (63.3 μ /mg protein) in var. M 6/1 and lowest (35.12 μ /mg protein) in var. Tr. 56 Bla. AS

Coconuts

- 816 Kinderlerer (JL) and Kellard (B). Alkylpyrazines produced by bacterial spoilage of heat-treated and gamma-irradiated coconut. *Chemistry and Industry* (16); 1987; 567-568

Alkylpyrazines - containing off-odours results from bacterial spoilage of desiccated coconut. Bacterial spoilage in coconut has taken place due to survival of heat or radiation - resistant bacteria including *Bacillus subtilis*. BV

Cottonseeds

- 817 El-Refai (AA), Owon (MA), Ammar (KA) and Harras (AM). Utilization of cottonseed proteins in Frankfurters. 1. Functional properties and digestibility of cottonseed proteins. *Chemie Mikrobiologie Technologie der Lebensmittel* 11(1); 1987; 13-17

The functional properties of cottonseed proteins (N solubility index, water holding capacity, emulsion stability and in vitro digestibility) and their possibility of using them as additives in meat products, e.g. in frankfurters is studied. The N solubility index and emulsion stability were higher for glandless cottonseed flour water absorption capacity was higher for glanded and glandless cottonseed flours. The digestibility of glandless cottonseed flour was slightly higher. The results indicate that the use of cottonseed protein as additives in meat products reduces formulation costs and improve processing yield, physical properties and digestibility. BV

Linseeds

- 818 Dev (DK) and Sienkiewicz (T). Isolation and subunit composition of 11S gloublin of linseed (*Linum usitatissimum* L.). *Nahrung* 31(7); 1987; 767-769 (De).

Reports the isolation of linseed globulin by a different procedure and its characterization by sodium dodecyl sulphate polyacrylaide gel electrophoresis (SDS-PAGE) and sedimentation analysis. BV

Lupins

Yu (RS-T), Kyle (WSA) and Tham (SH). Oil content and fatty acid composition of lupin seed grown in Victoria, Australia. *ASEAN Food Journal* 3(1); 1987; 31-32

The results indicate that the individual lupin var. grown under varying field conditions, the oil content and composition is relatively uniform and hardly affected by the apparently different environmental conditions. BV

Rapeseeds

- 820 Bau (HM), Mohtadi-Nia (DJ), Giannangeli (F) and Debry (G). Isolation of rapeseed proteins in acid medium effect of treatment on yield and physicochemical and nutritional properties. *Sciences des Aliments* 7(2); 1987; 337-359 (Fr).
- 821 Slominski (BA) and Campbell (LD). Gas chromatographic determination of indole glucosinolates-A reexamination. *Journal of the Science of Food and Agriculture* 40(2); 1987; 131-143

The use of gas-liquid chromatography (GLC) as a technique for the analysis of glucosinolates, including indole glucosinolates, in low-glucosinolate rapeseed meal and seed was assessed. Variation contributed by various steps of GLC methodology was studied, and following modifications to the method analytical results were compared with those estimated from thiocyanate ion (SCN) release following treatment of samples with myrosinase enzyme. The volume of water required to effectively elute glucosinolates from a DEAE Sephadex column was shown to cause variability in analytical results. The effect was dependent upon the internal standard used and was most pronounced for indole glucosinolates. Heat treatment (95 °C) required in the procedure for the inactivation of myrosinase enzyme was shown to result in substantial decomposition of indole glucosinolates. In this regard a standard procedure involving 15 min dry heat treatment followed by 3 min wet heat treatment is recommended. With these modifications the GLC methodology was shown to be adequate as a routine procedure for the analysis of glucosinolates in low-glucosinolate rapeseed meal and seed. AS

Soybeans

- 822 Shukla (VKS). Quantitative determination of oligosaccharides in defatted soybean products by high speed liquid chromatography. *FAT Science and Technology* 89(2); 1987; 75-79

An accurate, rapid, and reproducible high speed liquid chromatography (HSLC) is developed for the detn. of oligosaccharides in defatted soybean products at nanogram sensitivity. The extraction procedure is modified by incorporation of centrifugation and deproteinisation by a combination of freezing and using acetonitrile. The modified extraction procedure quantitatively extracts sugars from soy flour, while leaving behind undesirable organic contaminants. The HSLC method surpasses the HPLC with respect to total analysis time, precision, accuracy, and sensitivity. The lower limit of detn. is < 0.1 µg oligosaccharides. The method is suitable for samples having a low oligosaccharide content and a high concn. of interfering material. BV

Soy proteins

823 **Malcolmson (LJ), McDaniel (MR) and Hcehn (E).** Flavour protein interactions in a formulated soup containing flavoured soy protein. Canadian Institute of Food Science and Technology Journal 20(4), 1987, 229-235. The most effective method of storage.

The interaction between soy protein and chicken flavour on the perception of flavour was studied using a trained sensory panel. Four levels of soy protein were hydrated in four concn. of chicken flavour before adding to a formulated soup. Eight panelists evaluated all sixteen samples for pleasantness, and for chicken, soy and overall flavour intensity using magnitude estimation. Suppression of chicken flavour and pleasantness was observed at high levels of soy protein indicating masking or retention of the chicken flavour by the soy protein. The perception of soy flavour was not altered by increasing levels of chicken flavour. Soy protein and chicken flavour were found to equally contribute to the overall flavour intensity of the soup.

AS
824 **Yurawecz (MP).** 2-chloroethyl fatty acid esters as indicators of chloroethanol in black walnuts, seasoning mixes, and spices. Journal of the Association of Official Analytical Chemists 70(7), 1987, 1011-1013. The cassava LPC showed the following value for the biological parameters: $MPR = 3.4$, $TD = 82.5\%$, $BV = 73.6$ and $NPU = 60.7$. The cassava LPC is insoluble and is a bitter and satiating agent.

Residues of 2-chloroethyl fatty acid esters (CEE) and 2-chloroethanol by-products of ethylene oxide fumigation, were determined in black walnuts, seasoning mixes, and spices. Extracts containing ECH and CEE were cleaned up by previously described procedures, and residue levels were quantitatively determined using a gas chromatograph equipped with a halogen-selective electrode conductivity detector. All food products that contained CEE residues also contained ECH. ECH residues ranged from 0.008 to 0.080 p.p.m. and 0.2 - 7 times the CEE levels found. AS

Vegetables

TUBERS AND VEGETABLES

828 **Golden (DA), Heaton (EK) and Benchat (LR).** Effect of chemical treatments on microbiological, sensory and physical qualities of individually shrink-wrapped produce. Journal of Food Protection 50(8), 1987, 673-680.

Root vegetables
825 **Baloch (AR), Buckle (KA) and Edwards (RA).** Effect of sulphur dioxide and blanching on the stability of carotenoids in dehydrated carrot. Journal of the Science of Food and Agriculture 40(2), 1987, 187-189. Populations of microorganisms were detected on shrink-wrapped produce.

The influence of blanching and sulphur dioxide on the stability of carotenoids of dehydrated carrot was evaluated. The carotenoid content of untreated and treated carrots was measured after dehydration and during storage at 37 °C. Sulphur dioxide blanching was seen to increase the stability of carotenoids in both unblanched and blanched carrots during dehydration and storage at -37 °C.

C. Sulphur dioxide was found to be less effective by increasing blanching time to over 1 min, the carrot becoming just adequately blanched even in increased quantities upto $9621 \mu\text{g}^{-1}$. Sulphur dioxide was not effective in over blanched carrot. Blanching only upto the level of peroxidase inactivity and sulphiting is considered to be the most effective method of storage. NGKR

Tubers

Cassava

- 826 Rosas-Romero (A) and Baratta (C). Composition, functional properties, and biological evaluation of a plastein from cassava leaf protein. *Qualitas Plantarum - Plant Foods for Human Nutrition* 37(1); 1987; 85-96

Rats lost wt. continuously in a feeding trial conducted (2.2%) to evaluate biologically a cassava leaf protein conc. (LPC). The crude LPC had a high tannin content, 47% protein, and high levels of chymotrypsin and trypsin inhibitors, (27000 and 29500 units of inhibition resp). The application of the plastein reaction to the crude cassava LPC yield a product with 90% protein, brought about a tenfold reduction of the tannin content, and lowered the trypsin and chymotrypsin inhibitors concn. to a non-detectable level. The cassava plastein showed the following value for the biological parameters: PER = 2.2, NPR = 3.4, TD = 82.5%, BV = 73.6 and NPU = 60.7. The cassava LPC has a deep green colour, is bitter and astringent, and is insoluble in water. The plastein has a bland taste, a pale cream colour, is soluble in water, and has a high capacity of forming emulsions which are stable to thermal processing. AS

Potatoes

- 827 Meredith (P). Looking on the black side. some features of potato quality. *Food Technology in New Zealand* 22(5); 1987; 29-33

Vegetables

- 828 Golden (DA), Heaton (EK) and Beuchat (LR). Effect of chemical treatments on microbiological, sensory and physical qualities of individually shrink-wrapped produce. *Journal of Food Protection* 50(8); 1987; 673-680

Effects of four chemical treatments on microbiological, sensory and physical qualities of individually shrink-wrapped bell peppers, tomatoes, peaches and cantaloupes stored at 0 to 21 C were determined. With the exception of produce treated with guazatine, higher populations of microorganisms were detected on shrink-wrapped produce than on unwrapped produce as storage time increased. Treatment of wrapped produce with guazatine generally controlled microbial populations at about the same levels or at lower levels than those detected on unwrapped produce treated with imazalil, chlorine and a quaternary ammonium compound. Little inhibition of microbial growth compared to untreated produce was observed on fruits and vegetables treated with

the latter three chemicals. None of the chemicals had deleterious effect on sensory or physical qualities of produce, with the exception of imazalil which caused severe brown discoloration on wrapped and unwrapped peaches. Shrink-wrapping retarded loss of firmness of chemically treated and untreated bell peppers, but had little effect on changes in firmness of the other produce during storage. AS

- 829 Liepe (H-U). Lactofermented vegetable juices with starting cultures. *Flussiges Obst* 54(7); 1987; 380-381

Leuconostoc mesenteroides are not appropriate for the production of lactic acid vegetable juices owing to their high amount of acetic acid and dextran. BV

Cauliflower

- 830 Ahuja (KL), Hari Singh, Raheja (RK) and Labana (KS). The oil content and fatty acid composition of various genotypes of cauliflower, turnip and radish. *Qualitas Plantarum - Plant Foods for Human Nutrition* 37(1); 1987; 33-40

Leafy vegetables

Amaranthus

- 831 Bressani (R), Gonzalez (JM), Elias (LG) and Melgar (M). Effects of fertilizer application on the yield, protein and fat content, and protein quality of raw and cooked grain of three amaranth species. *Qualitas Plantarum - Plant Foods for Human Nutrition* 37(1); 1987; 59-67

Pumpkins

- 832 Asiegbu (JE). Some biochemical evaluation of fluted pumpkin seed. *Journal of the Science of Food and Agriculture* 40(2); 1987; 151-155

The analysis of fluted pumpkin seed *Telfuiria occidentalis* Hook f. gave protein of 31.1% and fat 47%. The protein was shown to be marked by deficient in the sulphur-containing amino acids like cystine and methionine followed by lysine, valine, isoleucine and phenylalanine. The oil was found to be useful for cooking purposes and its high degree of unsaturation will attribute its quality as drying oil to be used in paints and varnishes. NGKR

Tomatoes

Tomato ketchup

- 833 Bottiglieri (P), Sio (FD) and Leoni (C). HPLC determination of lycopene and carotenes in tomato products and their correlation with dry matter and potassium content. *Industria Conserve* 62(2); 1987; 119-122 (It).

FRUITS

- 834 Porretta (S). Investigation on the occurrence of radionucleides in fruits and vegetables intended for preservation. *Industria Conserve* 62(2); 1987; 123-126 (It).

The contamination levels (Cs-137 and Cs-134) of the most important fruits and vegetables processed (apples, pears, apricots, peaches, strawberries, cherries, olives, onions, cucumbers, sweet peppers, spinach, peas, green beans and kidney beans) by the Italian food-preserving industry is reported. BV

Apples

- 835 Smith (SM), Geeson (JD), Martin Browne (K), Genge (PM) and Everson (HP). Modified-atmosphere retail packaging of Discovery apples. *Journal of the Science of Food and Agriculture* 40(2); 1987; 165-178

An experimental modified atm. packaging system was used to compare the atmospheric compositions which developed within sealed packs made from a range of films of various permeability properties. The sensory quality attributes, background skin colour and flesh firmness of Discovery apples were studied. It was seen that the carbon dioxide and oxygen concn. within the packs were connected with the permeability of the film. In case of packing in low density polyethylene films held at 20 C the carbon dioxide and oxygen developed are 3-5% and 5-6% within 1-2 days resp. and softening and fruit yellowing markedly retarded. But in case of packing in some less permeable films atm. containing 12-20% carbon dioxide and 0.9-4% oxygen developed within 1-2 days resulting in retarded softening and yellowing of the fruit but also a high incidence of tainting. In this paper commercial applications, benefits and limitations of modified atm. packaging are presented. NGKR

Apricots

- 836 Trifiro (A), Saccani (G), Gherardi (S) and Bigliardi (D). Effect of content and size of suspended particles on the rheological behaviour of apricot purees. *Industria Conserve* 62(2); 1987; 97-104 (It).

Citrus fruits

- 837 Ahmad (M) and Khan (I). Effect of waxing and cellophane lining on chemical quality indices of citrus fruit. *Qualitas Plantarum - Plant Foods for Human Nutrition* 37(1); 1987; 47-57

Effects of waxing of the fruit and of the use of cellophane for lining storage boxes on chemical quality indices (including ethanol and acetaldehyde) and flavour scores of Feutrell's Early mandarin during storage at room conditions were determined. Max. changes during storage of waxed mandarins in film-lined boxes occurred in ethanol contents which were followed by acetaldehyde, total soluble

solids(TSS)/(acid ratio TSS) and acid contents. There were negative and highly significant linear relationships between flavour scores, and ethanol content and acetaldehyde content. The r^2 values indicated that over 90% of the variation in flavour scores could be explained by changes in ethanol and acetaldehyde contents whereas only 50% of the variation in flavour scores could be predicted by changes in total acid and TSS/acid ratios. There were comparatively greater increases in ethanol and acetaldehyde content, lesser increases in TSS and greater decreases in total solids of waxed mandarins during storage than those of unwaxed fruits stored in film lined boxes; the ratio of ethanol and acetaldehyde (E/A) of waxed mandarins was also higher. Decreases in citric acid content during storage correlated linearly to increases in the E/A ratio at the 1% level of significance indicating that citric acid metabolism was affected during storage of waxed mandarins at ordinary room conditions. AS

- 838 McHale (D), Khopkar (PP) and Sheridan (JB). Coumarin glycosides from *Citrus flavedo*. *Phytochemistry* 26(9); 1987; 2547-2549

Two coumarin glycosides of possible taxonomic significance have been isolated from aqueous extracts of bitter orange *flavedo* and shown to be the new natural products 8-(1-Beta-D-glucopyranosyloxy-1-methylethyl)-8-9-dihydro-2H-furo-[2,3-h]-1-benzopyran-2-one and 8-(3-Beta-D-glucopyranosyloxy-2-hydroxy-3-methylbutyl)-7-methoxy-2H-1-benzopyran-2-one. The latter glycoside was also present in aqueous extracts of grapefruit and pummelo *flavedo* but at lower levels. All the *flavedo* extracts contained meranzin, meranzin hydrate and isomer-anzin. AS

Grapes

- 839 Newman (HP) and Clingeffer (PR). Preliminary evaluation of alternative drying grape varieties. *Food Technology in Australia* 39(6); 1987; 294-296

Twenty four seedless grape var. (Thomuscat, Sultana Moscata, Emerald seedless, Fresno 58-93, CG 1481 Russian seedless) of Australia were dried and evaluated for replacements for traditional seeded raisins or for their potential to extend the range of dried fruit products, possibly as speciality wines. Data presented indicate that the var. Thomuscat, Sultana Moscata, Emerald seedless, Fresno 58-93, Russian seedless, Ms 23-7 and CG 1481 have potential as alternate raisin var. or for the production of specially dried fruit wines. The seedless nature of these var. reduces processing costs and give processed dried fruit of a higher quality than the traditional seeded raisin var. BV

Mangoes

- 840 Bradley (BF) and Scudamore-Smith (PD). Dry matter, a maturity standard for freezing mangoes. *Food Technology in Australia* 39(6); 1987; 298-300

Peach

- 841 Tongumpai (P) and Ketsa (S). Effect of packing materials and shipping containers on peach (*Prunus persica* cv. Flordasun) quality. *ASEAN Food Journal* 3(1); 1987; 39-40

Quince

- 842 Lesinska (E). Characteristics of sugars and acids in the fruits of East Asian quince. *Nahrung* 31(7); 1987; 763-765 (De).

Raisins

- 843 Sandhu (DK), Raman Puri and Neelam Kamra. Yeasts associated with raisins. *Indian Journal of Microbiology* 27(1/4); 1987; 59-62

The yeast population in 30 samples of raisins collected from the local market was investigated. Out of these, 19 samples (63.3%) were positive for yeast and yielded 66 isolates belonging to 10 genera and 18 sp. *Candida famata* was the most frequently isolated yeast sp. followed by *C. robusta*. The raisins had a pH range of 3.20 to 3.95 and moisture content of 5.6 to 8.2%; the sugar content ranged from 48.0 to 75.0%. The raisins with highest sugar and moisture content and comparatively higher pH yielded max. yeast number. The yeast colony count ranged from 2.14×10^4 to 7.80×10^4 count/g (dry wt.). KAR

CONFECTIONERY, STARCH AND SUGAR

Confectionery

- 844 Anon. Coating a-la-carte. *Food Manufacture* 62(9); 1987; 35-36
- 845 Sweetmaker. Nut and cream pastes. Part three. *Confectionery Production* 53(8); 1987; 583-584

Chewing gums

- 846 Anon. Extrusions: Does chewing gum pass the taste test? *Food Manufacture* 62(9); 1987; 47, 49, 50

BAKERY PRODUCTS

Bread

- 847 Macritchie (F). Evaluation of contributions from wheat protein fractions to dough mixing and breadmaking. *Journal of Cereal Science* 6(3); 1987; 259-268

The proteins from glutens of six wheat var. three of high and three of low baking performance, were fractionated into either nine or

ten fractions by successive extraction with dilute HCl. Fractions were added to base flours so as to increase protein level by one percentage point; the fortified flours were assessed in terms of their Mixograph peak development times and loaf volumes in an optimised breadbaking test. Early-extracted fractions (gliadins) decreased mixing requirements and slightly depressed loaf volumes. Intermediate fractions (glutenins) induced large increases in both dough development times and loaf volumes, but this trend was reversed by the latest-extracted fractions, including the final residue. Most notably, glutamic acid and proline contents were substantially lower in the latest fractions. Using 0.75 M NaCl, larger amounts of protein (believed to be the main protein present in the latest fractions) were extractable from glutes of the poorer flours than those of the better-performing flours. The relative proportion of these globulin-type proteins to the glutenins appears to be important in determining baking quality. AS

- 848 Sturm (W). Wood strewing flour for bread and pastry (Food additive Working materials) *Deutsche Lebensmittel-Rundschau* 83(4); 1987; 111-113 (De).

Cakes

- 849 Joglekar (AM) and May (AT). Product excellence through design of experiments. *Cereal Foods World* 32(12); 1987; 857-868

A sequential approach was used to optimize cake quality and develop a formulation that was both cost effective and tolerant. A total of 26 trails were required to optimize the cake formulation as compared to the 77 trials in the original Kissel experiment. The sequential approach implies a 66% reduction of the effort for every step C (compounding the mix, preparing the batter, baking and evaluating the cake) except baking. The sequential approach requires less time resulting in a 25% reduction in baking effort. BV

- 850 Pafumi (J) and Durham (R). Cake shelf life extension. *Food Technology in Australia* 39(6); 1987; 286-287

Noodles

- 851 Lee (C-H), Gore (PJ), Lee (H-D), Yoo (B-S) and Hong (S-H). Utilisation of Australian wheat for Korean style dried noodle making. *Journal of Cereal Science* 6(3); 1987; 283-297

Korean style dried noodles were prepared from 33 different Australian wheat flours; 17 samples were made from seven wheat var. of various protein levels and 16 samples were prepared from four classes of Australian wheat, each milled to four levels of extraction. The chemical composition and physical properties of each flour were analysed and the fresh, dried and cooked noodle qualities were evaluated by both instrumental and organoleptic methods. Wheat var. and district of cultivation, protein content, flour pasting properties and flour colour grade were seen as important factors in determining the quality of noodles. Hunter lab colour difference meter measurements

MILK AND DAIRY PRODUCTS

852 Batish (VK) and Harish Chander. Occurrence of *Staphylococcus aureus* and their preformed enterotoxins in frozen dairy products, Australian Journal of Dairy Technology 42(1/2): 1987; 22-24, 32

The investigation on the fifty samples of frozen dairy products revealed that all were contaminated with *Staphylococcus aureus*. These

products can become potential health hazards. Insufficient inspections are not taken during their preparation and sale. In view of the lack of effective means of ensuring the adoption of hygienic methods and practices during the production and handling of these products or of preventing the sale of contaminated and unsafe products to the community, frozen dairy products are bound to endanger the health of the consumers. NGKR

853 Brandao (RL), Nicoli (JR) and Figueiredo (AFDS). Purification and characterization of a *Beta*-galactosidase from *Fusarium oxysporum*. *Journal of Dairy Science*; 70(7); 1987; 1931-1937

Purification of Beta-D-galactosidase from *Fusarium oxysporum* var. *Linn.* and the enzymatic and physiochemical properties of the enzyme are discussed. The enzyme was purified from cellular extract of the organism by heat shock and successive chromatography on DEAE-cellulose DE 52 and Sephadex G-100. The purified enzyme was homogeneous on SDS gel electrophoresis. Cations such as Zn^{++} , Mg^{++} and Ca^{++} inhibited the enzymes. 3.83 was the pI and 5.0 and 55 C were resp. the optimum pH and temp. By gel filtration the mol. wt. was found to be 22,400 and by SDS-PAGE it was 36,300. The enzymes was considered a hexamer. MVG

854 Guirguis (N) and Hickey (MW). Factor affecting the performance of thermophilic starters. 2. Sensitivity to the lactoperoxidase system. *Australian Journal of Dairy Technology* 42(1/2); 1987; 14-16, 26

This study was carried out to examine the sensitivity of a range of certain organisms to some dairy sanitizers commonly used in Australia like Quarternary ammonium compound (QAC) iodine based sanitizer, chlorine based sanitizer etc. The organisms tested were a number of species and strains of thermophilic streptococci and lactobacilli for inhibition of acid production by the above sanitizers. The results revealed that thermophilic starter organisms were found to be generally more sensitive to dairy sanitizers commonly used in Australia while the residues of dairy sanitizers based on iodine and chlorine are not likely to cause inhibition problem. QAC sanitizer may constitute problem in the concn. range of 0.5 to 20 mg/L. NGKR

855 Prajapati (JB), Shah (RK) and Dave (UM). Survival of *Lactobacillus acidophilus* in blended spray-dried acidophilus preparations. *Austra-*

lian Journal of Dairy Technology 42(1/2); 1987; 17-21

Milk

- 856 Bansal (HR). How to use the milk pasteurizer in a better way. Indian Dairyman 39(11); 1987; 533-534

Problems confronting the use of pasteuriser effectively are discussed and the solutions are indicated. Improper pasteurization, reduction in flow/capacity and temp. of the pasteurized milk not getting sufficiently low are some of the problems. KAR

- 857 Dominguez (L), Garayazabal (JFF), Ferri (ER), Vazques (JA), Gomez-Lucia (E), Ambrosio (C) and Suarez (G). Viability of *Listeria monocytogenes* in milk treated with hydrogen peroxide. Journal of Food Protection 50(8); 1987; 636-639

The susceptibility of *Listeria monocytogenes* to hydrogen peroxide in sterilized and raw milk was studied. In raw milk *L. monocytogenes* was less susceptible to hydrogen peroxide than milk microflora. The ratio of *L. monocytogenes* to total milk microorganisms (natural microflora plus added *L. monocytogenes*) increased when raw milk was stored at refrigeration temp. (4 °C), due to a selective enrichment of *Listeria* present in milk. In sterilized milk, a concn. of 0.0495% hydrogen peroxide and 9 h were required to produce complete destruction of *L. monocytogenes* when this microorganism was in pure culture, although a reduction in *Listeria* counts was observed at 1.5 h. When sterilized milk was simultaneously contaminated with *L. monocytogenes*, *Staphylococcus aureus* and *Streptococcus faecalis*, a decrease in *L. monocytogenes* count during the first 24 h was observed at 0.0495% hydrogen peroxide. From this time *L. monocytogenes* recovered and multiplied reaching levels similar to the initial counts at the end of the experiment. AS

- 858 Doyle (MP), Glass (KA), Berry (JT), Garcia (GA), Pollard (DJ) and Schultz (RD). Survival of *Listeria monocytogenes* in milk during high temperature, short-time pasteurization. Applied and Environmental Microbiology 53(7); 1987; 1433-1438

- 859 Farag (RS), Ahmed (FA), Abdel Gawad (IA), Hewedi (MM) and Mahmoud (EAM). Effect of milk processing on the unsaponifiables and phospholipids of milk fractions. Grasas Y Aceites 38(1); 1987; 39-44

The unsaponifiables and phospholipids of cow, buffalo and goat milks and milk fractions were studied. Unsaponifiable hydrocarbons of the milks and their fractions contained at least 21 compounds and the most abundant hydrocarbons were C10, C20 and C22. Cow milk and its fractions contained the highest cholesterol concn. followed by buffalo and goat milk fractions. Cholesterol level of the various milk fractions was found to follow the sequence cream > butter > ghee > butter milk > milk > skim milk irrespective of the milking animal origin. The milk total phospholipid contents of various animal species and milk fractions were in the decreasing order goat > buffalo > cow and butter milk > cream > skim milk > butter > ghee, resp. Milk centri-

fugation and butter heating processes had very little effect on the hydrocarbon and phospholipid compositions of the milk fractions and the primary products. Conversely cream ripening and churning processes altered the hydrocarbons and certain phospholipids of cream. AS

- 860 Grover (S), Batish (VK) and Yadav (JS). Methods for detection of aflatoxins in milk and milk products. *Indian Dairyman* 39(11); 1987; 527-532

The three methods of detection of aflatoxin in milk and milk products, i.e. physico-chemical, serological and biological are described. The aspects discussed under physico-chemical analysis; include extraction, purification, TLC separation and quantitation; and under serological assay, immunoassay and radio immunoassay including the sensitivity. KAR

- 861 Jane Lin (F), Morgan (JN), Eitenmiller (RR), Barnhart (HM), Toledo (RT) and Maddox (F). Thermal destruction of *Staphylococcus aureus* in human milk. *Journal of Food Protection* 50(8); 1987; 669-672, 680

The present study discusses thermal injury and the rate of thermal destruction of *S. aureus* in human milk, using HTST pasteurization conditions. BV

- 862 Lanteaume (M-T), Fichard (P), Banner (C), Chicot (J-P) and Pailler (F-M). Protein value of products made from a single milk collection. *Sciences des Aliments* 7(2); 1987; 189-203 (Fr).

Five lyophilised products (milk, yoghurt, buttermilk, fresh cheese, and fermented cheese) made from single collection of 717 l of milk, treated by well established technological processes were studied for real utilization digestive coefficient (RUDC), net protein utilization (NPU), net protein ratio (NPR), and protein retention efficiency (PRE). All the products have good protein value. Yoghurt and buttermilk have lower PRE versus the same parameters obtained with whole milk (-9% and -17% resp.). The PRE of the fermented cheese is less (-8%) than that of the fresh cheese. BV

- 863 Misra (AK). Pasteurization in city plants. *Indian Dairyman* 39(11); 1987; 519-520

A general article briefly describes the methods for achieving efficiency in pasteurisation of milk in dairy plants. MVG

- 864 Nieuwenhof (FFJ) and Hoolwerf (JD). Impedance measurement as an alternative to the plate count method for estimation of the total count of bacteria in raw milk. *Journal of Food Protection* 50(8); 1987; 665-668

- 865 Olsen (JR) and Ashoor (SH). An assessment of light-induced off-flavours in retail milk. *Journal of Dairy Science* 70(7); 1987; 1362-

Skim-milk

- 866 Omar (MM) and Smietana (Z). Fractionation of proteins in reconstituted skim-milk. *Nahrung* 31(4); 1987; 291-295 (De).

Properties of the dried milk were improved when calcium chloride was added to the raw milk prior to the drying process. Solubility, wettability, undenatured whey protein, whey protein indices of the dried milk were increased and the reconstitutability was improved. The elution profile of the protein fractions on a Sephadex G-100 column differed according to the forward preheating of the raw milk and the addition of calcium chloride. AS

Milk products

Cheese

- 867 Assimakopoulos (PA), Ioannides (KG), Pakou Paradopoulou (CV). Transport of the radioisotopes iodine-131, Cesium-134, and Cesium-137 from the Fallout following the accident at the Chernobyl Nuclear Reactor into cheese and other cheesemaking products. *Journal of Dairy Science* 70(7); 1987; 1338-1343

The transport of the radionuclides 131, 134 Cs and 137 Cs from the original milk to various products of cheese making has been studied. MVG

- 868 de Ruig (WG). Determination of natamycin in cheese and cheese rind. *Journal of the Association of Official Analytical Chemists* 70(6); 1987; 949-954

This collaborative study involved 37 laboratories in 13 countries. Spectrometry and LC were used to investigate eight samples consisting of 4 duplicates. The former method gave good results with a coeff. of variation of 12% and the LC with ultraviolet detection gave reasonable results with a coeff. of variation of 25% for levels down to 15 mg/kg. For very low levels a preconcentration step was necessary. MVG

- 869 de Ruig (WG), van Oostrom (JJ) and Leenheer (K). Spectrometric and liquid chromatographic determination of natamycin in cheese and cheese rind. *Journal of the Association of Official Analytical Chemists* 70(6); 1987; 944-948

Cheese and rind samples are extracted with methanol and fat precipitated by cooling in methanol water at 15 to -20 C for Ca 1h. Natamycin levels are measured by UV spectrometry at absorbance min. 311 nm, max. 317 nm and at exactly 329 nm. By LC it was measured over Lichrosorb RP-8 columns with detection at 303 nm. For measuring low levels, a concn. step is provided. The method is applicable to measuring natamycin in cheese and rind samples with a detection limit of 0.5 mg/kg. MVG

- 870 Deger (D) and Ashoor (SH). Light-induced change in taste, appearance, odour, and riboflavin content of cheese. *Journal of Dairy Science* 70(7); 1987; 1371-1376

- 871 Gomez (R), Fernandez-Salguero (J) and Marcos (A). Free and esterified fatty acids composition of some commercial cheese varieties. *Ciencas Y Aceites* 38(1); 1987; 23-26

Total fatty acids in 30 commercial var. cheese samples San Simon Edam, Roncal and Ibores were determined using gas-liquid chromatography. The relative proportion of some fatty acid and the data obtained in 24 relationships between them constitute the basis of the discussion about the type of milk used in the manufacture of each var. Major free fatty acids composition in each var. of cheese was determined. AS

Cheddar cheese

- 872 Horwood (JF), Stark (W) and Hull (RR). A "Fermented yeasty" flavour defect in cheddar cheese. *Australian Journal of Dairy Technology* 42(1/2); 1987; 25-26

The storage studies on cheddar cheese showed that it had developed a fermented flavour defect after 6 months storage and it contained higher levels of ethanol, ethylacetate and ethylbutyrate. Further this was also found to be high in moisture(39%) and it contained high levels of *Candida* sp. NGKR

Chocolate milk

- 873 Abhay Kumar) and Mulay (CA). Chocolate milk - a refreshing dairy beverage. *Indian Dairyman* 39(11); 1987; 523-526

The aspects covered in this general article include: processing of chocolate milk, including its chemical composition, shelf life of chocolate milk, process for chocolate milk powder production and its composition, reconstitution, and shelf life. KAR

Curd

- 874 Dejmek (P). Dynamic rheology of rennet curd. *Journal of Dairy Science* 70(7); 1987; 1325-1330

Sandesh

- 875 Sen (DC) and Rajorhis (GS). Sensory evaluation of Sandesh. *Indian Dairyman* 39(11); 1987; 535-541

Desirable and undesirable sensory characteristics of three var. of Sandesh, namely, soft grade, hard grade and Kachhacolla, are described and the method of evaluating these sensory characteristics are outlined. The common defects observed in Sandesh are briefly indicated. KAR

Whey

- 876 Manji (B) and Kakuda (Y). Determination of whey protein denaturation in heat-processed milks: Comparison of three methods. *Journal of Dairy Science* 70(7); 1987; 1355-1361

Fast protein liquid chromatography was used to determine whey protein denaturation and the results were compared with differential scanning calorimetry and Kjeldahl nitrogen as salt. No differences were noticed between fast protein liquid chromatography with Kjeldahl nitrogen but there were significant difference between fast protein liquid chromatography and whey protein nitrogen index and between Kjeldahl nitrogen and whey protein nitrogen index. Fast protein liquid chromatography appears to be an effective method to determine whey protein denaturation in heat-treated milks. MVG

Yoghurt

- 877 Guirguis (N), Versteeg (K) and Hickey (MW). The manufacture of yoghurt using reverse osmosis concentrated skim milk. *Australian Journal of Dairy Technology* 42(1/2); 1987; 7-10

This study was carried out to compare the physical properties of yoghurts in which the premix was prepared using skim milk concentrated with skim milk powder or reverse osmosis alone to increase the total solids and with the inclusion of whey protein conc. The results showed that using skim milk powder to fully reconstitute the premix reduced the viscosity and increased syneresis as compared to a control where the total solids of fresh skim milk was increased with skim milk powder whereas when milk was concentrated by reverse osmosis the resulting product had better viscosity and syneresis over the control. But addition of whey protein conc. did not further improve the viscosity of yoghurts made using milk concentrated by reverse osmosis. NGKR

Milk proteins

- 878 Rudzik (L), Wust (E), Laven (F-J) and Marquardt (U). Deconvolution of milk protein infra-red spectra. *Zeitschrift fur Lebensmittel-Untersuchung und -Forschung* 185(4); 1987; 271-274 (De).

MEAT AND POULTRY

- 879 Childers (AB). New advances in humane slaughter of meat animals. *Journal of Food Protection* 50(8); 1987; 709-710
- 880 Shaw (BG), Harding (CD), Hudson (WH) and Farr (L). Rapid estimation of microbial numbers on meat and poultry by the direct epifluorescent filter technique. *Journal of Food Protection* 50(8); 1987; 652-657

Meat

- 881 Alonge (DO). Factors affecting the quality of smoke-dried meats in Nigeria. *Acta Alimentaria* 16(3); 1987; 263-270

The smoking of meats in Nigeria is a preservative method in which salted or unsalted meat is set over a low burning wood fire in various types of ovens. The glow and smoking temp. are high, reaching 160 C and 180 C, resp. Smoking lasts 3-15 days leading to a dark smoked meat product. The temp. and the intensity of smoking affect the meat product quality through the levels of dryness, phenol and benzo(a)pyrene contents. Smoke-dried meat products have low flavour. Most of the smoke-dried meats are considered unwholesome with an average benzo(a)pyrene level of 41.03 mg per kg but will remain ordinarily shelf stable at the moisture content of 41.65 g per 100 g and available water (water activity = 0.824). AS

- 882 Shay (BJ) and Egan (AF). The packaging of chilled red meats. *Food Technology in Australia* 39(6); 1987; 283-285

Discusses packaging of chilled red meats, meat colour, vacuum packaging, vacuum-skin packaging, gas packaging (nitrogen, carbon dioxide and gas mixtures), modified atmosphere packaging of consumer cuts and advantages and disadvantages. BV

- 883 Wu (FY) and Smith (SB). Ionic strength and myofibrillar protein solubilization. *Journal of Animal Science* 65(2); 1987; 597-608

Evidence is presented which suggests that physiological ionic strengths elicit myofibrillar protein solubilization and indicate that such action is significant with enzymatic proteolysis. It is proposed that elevated ionic strength in muscle post mortem is one of the mechanisms responsible for postmortem tenderisation of meat. MVG

- 884 Yun (J), Shahidi (F), Rubin (LJ) and Diosady (LL). Oxidative stability and flavour acceptability of nitrite-free meat-curing systems. *Canadian Institute of Food Science and Technology Journal* 20(4); 1987; 246-251

The oxidative stability imparted to meat by combinations of antioxidants and/or chelators was assessed by the 2-thiobarbituric acid (TBA) test, and their effect on flavour acceptability was determined by sensory evaluation. The TBA results show that, at the 30 p.p.m level, test-butyl hydroquinone (TBHQ) was the most effective antioxidant tested followed by butylated hydroxyanisole (BHA). Using surface response methodology, effective concn. combinations of sodium ascorbate (SA) with either sodium tripolyphosphate (STPP) or ethylenediaminetetraacetic acid disodium salt added to meat samples to give specified range of TBA values were predicted. Sensory evaluation indicated that the flavour of the untreated (control) meat samples was significantly (P less than or equal to 0.05) less acceptable than that of the nitrite-cured reference. The flavour scores of samples treated with a mixture consisting of 3000 p.p.m STPP, 550 p.p.m SA,

and 30 p.p.m of TBHQ or BHA were not significantly different from that of nitrite-cured meat. AS

Beef

- 885 Berry (BW), Leddy (KF) and Ono (K). Processing and freezing of steaks from pre-rigor beef muscle. *Sciences des Aliments* 7(2); 1987; 177-187 (Fr).

This paper reports the evaluation of processing and freezing on wt. loss, sarcomere length, shear force, sensory attributes and cooking properties of beef lion steaks. The beef lion steaks were stored for 90-100 days at -40, -18 and -23 C. Sarcomere length was not affected by electrically stimulated (ES) either in hot or cold-processed steaks, but tenderness improved. Cooking properties were not affected by ES. Freezing temp. did not influence tenderness values of hot processed steaks. Cold processed steaks had higher tenderness scores and lower shear force values than hot processed steaks. Storage temp. of -18 C reduced the intensity of beef flavour in cooked steaks compared to 40 C. BV

- 886 Hood (RL). A note on the cholesterol content of beef rib steaks. *CSIRO Food Research Quarterly* 47(2); 1987; 44-46

Bovines

- 887 Paterson (BC) and Parrish (FCJr). SDS-PAGE conditions for detection of titin and nebulin in tender and tough bovine muscles. *Journal of Food Science* 52(2); 1987; 509-510

Purified myofibrils were prepared from *Infraspinatus* (tender) and *Rhombodeus* (tough) muscles at 7 days postmortem and examined for myofibrillar cytoskeletal protein degradation by using sodium dodecyl sulphate polyacrylamide gel electrophoresis (SDS-PAGE). Four acrylamide/bisacrylamide ratios (37:1, 50:1, 75:1 and 100:1) and two SDS PAGE gel buffers (tris, Hcl, pH 8.0 and 8.9) were used to determine the optimum conditions for detection of titin and nebulin. Titin was degraded to a greater extent in myofibrils from the *Infraspinatus* than in myofibrils from the *Rhombodeus*. Very little nebulin was detected in either muscle. Use of acrylamide/bisacrylamide ratio of 37:1 and a gel buffer of pH 8.0 provided the most optimum conditions for detecting differences in the resolution of titin, nebulin and their apparent degradation products. AS

Pork

- 888 Davis (CE), Lyon (BG), Reagan (JO) and Townsend (WE). Effect of heating on water soluble Biuret-positive compounds of canned cured pork picnic shoulder. *Journal of Food Protection* 50(8); 1987; 681-684

Swine

- 889 West (RL) and Myer (RO). Carcass and meat quality characteristics and backfat fatty acid composition of swine as affected by the consumption

of peanuts remaining in the field after harvest. *Journal of Animal Science* 65(2); 1987; 475-480

Meat products

- 890 Ellis (PC) and Rand (AGJr). Comparison of methods for determination of lactose (Nonfat Dry Milk) in meat products. *Journal of the Association of Official Analytical Chemists* 70(6); 1987; 1063-1068
- 891 Hall (CC), Hitchcock (CHS) and Wood (R). Determination of soy protein in meat products by a commercial enzyme immunoassay procedure. *Journal of the Association of Public Analysts* 25(1); 1987; 1-27

The results of a collaborative trial of enzyme immunoassay kits supplied by Biokits Ltd for the detn. of soy protein in meat products are reported. Fourteen laboratories analysed uncooked sausages, uncooked beefburgers, uncooked pates, and cooled pates containing different known levels of soy flour, isolate, conc. and/or texturate. Blanks, samples; accuracy and precision were estimated by statistical analysis. Overall recoveries were 80-100%. Multiple analysis of one sample indicated an 11% overall coeff. of variation. Reproducibility between different laboratories was better than that of an immunoassay procedure previously tested but unavailable in kit format. The current kit was easy to use: all the specialised materials (antiserum, enzyme conjugate, substrates, pre-sensitised microwells, soy standards, etc.) were included and none of the participants reported any significant problems in following the protocol provided. No prior knowledge about the type of soy ingredient nor the composition of the meat product is necessary. Within the limitations of this study it may be concluded that, using a single arbitrary soy standard as a reference, the levels of soy protein in a raw or pasteurised meat product of entirely unknown composition may be reliably estimated with repeatability and reproducibility up to 1 and 2 g/100 g resp. with a recovery of 80-100% of added soy protein; these characteristics are significantly better than those found in previous trials. AS

Poultry

- 892 Bailey (JS) and Cox (NA). Evaluation of the Petrifilm SM and VRB dry media culture plates for determining microbial quality of poultry. *Journal of Food Protection* 50(8); 1987; 643-644

Reports the effectiveness of the petrifilm SM and VRB dry media culture plates with traditional standard methods for enumerating total aerobic plate counts and coliform counts from poultry carcasses at various degrees of freshness. BV

Poultry products

Eggs

- 893 Bawa (AS), Sukhcharanjit Singh and Sandhu (KS). Storage stability of hard-cooked eggs. *Poultry Guide* 25(1); 1987; 91-97

Hard-cooked eggs were (i) dipped in water (control), (ii) coated with wax, (iii) dipped in paraffin oil, and (iv) sprayed with paraffin oil. 50% of the eggs in each batch were stored under refrigeration (0-4 °C) and the other 50% at room temp. (22-28 °C). Refrigerated eggs were acceptable even after 40 days of storage, except for the oil-sprayed batch which showed a deterioration in flavour. At room temp., wax coated and oil-dipped eggs had the longest shelf-life (25 days), while acceptability of control and oil-sprayed eggs was poor after 15 days. Refrigeration resulted in negligible wt. loss. KAR

- 894 Mohr (K-H), Kleinschmidt (T) and Borgwardt (J). Concentration of egg white by ultrafiltration. *Nahrung* 31(4); 1987; 345-347 (De).

The present study investigates the possibility of concentrating egg white by membrane processes with a new plate-type of equipment produced in GDR. The results of electrophoretic investigations of concn. and nature of egg white indicate no influence on protein by mechanical stress due to ultrafiltration. The filtration losses are negligible. BV

SEAFOODS

Fish

- 895 Han (T-J) and Liston (J). Lipid peroxidation and phospholipid hydrolysis in fish muscle microsomes and frozen fish. *Journal of Food Science* 52(2); 1987; 294-296, 299

The interaction between lipid peroxidation and phospholipase A_2 was investigated in fish muscle microsomes and frozen fish muscle. Lysophosphatidylcholine (LPC), a phospholipid hydrolysis product produced by the activity of phospholipase A_2 , was detected in the lipids extracted from microsomes peroxidized by incubation with NADH and $ADP-Fe^{3+}$. No detectable level of LPC was found in the microsomal lipids when NADH was withdrawn from the reaction mixture nor in the untreated microsomal lipids. LPC level in the lipids extracted from unheated microsomes was considerably higher than that from heat-treated microsomes when both were peroxidized by incubation with ascorbate and Fe^{3+} . Phospholipase A_2 was activated by either NADH-dependent or ascorbate-induced lipid peroxidation in vitro. The levels of lipid peroxidation in fish muscle were higher when fish were stored at higher frozen storage temp. and so were the levels of LPC. AS

- 896 Len (PP). Mesophilic spoilage of marine fish: bay trout (*Arripis trutta*), Bream (*Acanthopagrus butcheri*) and mullet (*Aldrichetta forsteri*). *Food Technology in Australia* 39(6); 1987; 277-282

- 897 Mochizuki (Y), Saito (T), Iso (N), Mizuno (H), Aochi (A) and Noda (M). Effects of adding fat on rheological properties of fish meat gel. *Bulletin of the Japanese Society of Scientific Fisheries* ('Nihon Suisan Gakkai-shi') 53(8); 1987; 1471-1474

Rheological properties of fish meat gel having various content of fat, by the thermal analysis and the stress-strain experiment is reported. BV

- 898 Panaro (KW), Erickson (D) and Krull (IS). Determination of methylmercury in fish by gas chromatography direct current plasma atomic emission spectrometry. *Analyst* 112(2); 1987; 1097-1105

Gas chromatography (GC) has been interfaced with a direct current plasma (DCP) atomic emission spectrometer to perform highly specific and selective detn. of methylmercury (MeHg) in fish samples. A simple, isothermal, low-cost GC was constructed which could be dedicated to the DCP, allowing routine qualitative and quantitative detn. of organomercury species in complex food matrices. In most instances, qualitative and quantitative results for incurred and spiked levels did not agree for the GC-DCP and GC-ECD approaches. An additional extraction procedure has also been developed for MeHg from fish samples involving extraction with an organic solvent, concn. and injection on to the GC column. Depending on the particular organic solvent employed, artifact formation of MeHg can occur as a result of the extraction-GC conditions. KAR

- 899 Srinivasa Gopal (TK), Jose Joseph and Govindan (TK). Use of linear low density polythene film for frozen fish packaging. *Fishery Technology* 24(2); 1987; 116-118

Physical properties of linear low density polythene (LLDP) film of 60 gauge thickness and its suitability to pack frozen fish was studied and compared with the conventional 100 gauge low density polythene (LDP) film. Both showed similar water vapour transmission rate at 38 °C and -20 °C. Eventhough the tearing strength of LLDP was inferior to LDP, it is of no significance in its use in frozen fish industry. For a 2 kg block of institutional pack of frozen prawn an area of 0.3021 sq. m. is needed which cost 14 paise compared to 23 paise for the same area of LDP. KAR

- 900 Tozowa (H). Factors affecting the formation of volatile N-nitrosamines in the preparation process of fish meals. *Bulletin of the Japanese Society of Scientific Fisheries* ('Nihon Suisan Gakkai-shi') 53(8); 1987; 1449-1456 (Ja).

Results of the present study indicate that the amount of volatile N-nitrosamines (VNA) formed were found to be directly proportional to nitrite concn., in contrast, the VNA levels were lowered by increment of moisture contents in the meals. Nitrosodimethylamine (NDMA), nitrosopyrrolidine (NPYR) and nitrosothiazolidine (NTHZ) formation in the nitrite treated samples increased with raised temp. (80 to 140 °C). Samples heated at 150 °C or above showed lesser amount of NTHZ, NPYR and NTHZ except NDMA which increased consistently. The VNA formation in nitrite treated samples were influenced by freshness or storage period of raw fish materials. Fish meals from decomposed materials yielded low levels of both NDMA and NTHZ, while NPYR contents increased. The amounts of NDMA and NPYR

formed in the nitrite-treated samples were proportional to the levels of trimethylaminoxide and proline in the test meals, indicating that these compounds would be the principal precursors of respective VNA. The VNA levels in the nitrite-treated samples decrease gradually during storage at 30-10 and even -10 C, and the higher the storage temp. the decreasing rate will be faster. BV

Anchovy

- 901 Takiguchi (A). Lipid oxidation and hydrolysis in dried anchovy products during drying and storage. *Bulletin of the Japanese Society of Scientific Fisheries* ('Nihon Suisan Gakkai-shi') 53(8); 1987; 1463-1469 (Ja).

Barracuda

- 902 Joseph (AC), Prabhu (PV) and Balachandran (KK). Studies on dried/smoked barracuda. *Fishery Technology* 24(2); 1987; 96-98

Fresh barracuda (*Sphyraena* spp) were salted and sun-dried to 40% moisture and stored at ambient temp. as such or smoking for 5 h at 45 C and after packing in 200 gauge polythene bags. The physical, chemical (moisture, chloride %, total volatile base N(TVBN), pH, water activity) and organoleptic scores were determined after storage of dried barracuda upto 9 wk and smoked barracuda upto 19 wk. Initial increase in TVBN content after drying as well as smoking did not show significant effect on organoleptic qualities of the products. Smoking was found effective in delaying the onset of fungal attack and also in improving the organoleptic qualities. KAR

Cod

- 903 Cormier (A) and Leger (LW). Effect of sodium polyphosphates on frozen cod fillets *Gadus morhua*. *Canadian Institute of Food Science and Technology Journal* 20(4); 1987; 222-228

Fresh cod fillets were treated with polyphosphates - Sodium hexametaphosphate (HX) sodium tripolyphosphate (TP), tetra sodium pyrophosphate (PP) FREEZGARD RFP-19 (FP). The frozen and stored fillets were evaluated for quality characteristics. No significant differences were found in pick-up wt. or thaw drip. Fillets stored for 5 wk. and dipped in HX, TP, FP showed less cooking loss and were more tender and juicy. Among the fillets stored for 31 wk, PP treated fillets had higher pH, less expressible moisture, and better sensory properties. The extended frozen storage resulted in significantly less thaw drip and significantly more expressible moisture than the 5 wk storage period. The beneficial effects of exposing cod fillets to polyphosphate solutions prior to freezing appeared to be minimal in comparison to exposing fillets to water. BV

Mackerel

- 904 Hanumanthappa (B) and Chandrasekhar (TC). Preparation and keeping quality of hot smoked mackerel. *Fishery Technology* 24(2); 1987; 112-

115

A method has been standardised for the production of smoke cured mackerel by dry salting with a salt to fish ratio of 1:8 followed by smoking in a traditional smoke chamber at 70 plus or minus 5 °C for 5 h. The smoke could be generated by burning moist coconut husk and saw dust. Such product had shelf-lives of 105, 95 and 6 days in chilled storage (0 to 2 °C) refrigerated storage (10 plus or minus 2 °C), and at room temp. (29 plus or minus 2 °C) resp. The changes in free fatty acids, thiobarbituric acid value, peroxide value, total volatile basic N, total amine N, steam volatile, and non-volatile phenols, total plate count, mould count and pH were noted at regular intervals during the storage period. KAR

- 905 Ravindranathan Nair (P), Chinamma George, Nirmala Thampuran, Perigreen (PA) and Gopakumar (K). Studies on frozen storage characteristics of individually quick frozen and block frozen mackerel. *Fishery Technology* 24(2); 1987; 103-108

Mackerel (*Rastrelliger kanagurta*) of medium (4%) and high (11%) lipid contents were quick black frozen individually (IQF) and as frozen (BF) and stored at -23 °C for 32 wk. BF had higher frozen storage life than IQF samples. Sensory evaluation showed that IQF samples of medium and high lipid contents stored well for 17 and 20 wk while BF samples of the same series stored well for 23 and 24 wk resp. Changes in moisture content, non-protein N, peroxide value, free fatty acid content, thiobarbituric acid value, and total plate counts were noted at 4 wk intervals during the storage period of 32 wk. KAR

Murrel

- 906 Perigreen (PA), Jose Joseph, Surendran (PK) and Gopakumar (K). Studies on iced storage of common murrel (*Channa striatus*). *Fishery Technology* 24(2); 1987; 99-102

Shelf life of common fresh water murrel stored in ice has been studied over a 13-day period. During iced storage, non-protein N and alpha amino N in fish muscle decreased and the fish became unacceptable during the period although the total volatile base N was not high. Total bacterial count decreased steeply during initial stages of storage and then increased steadily on further storage. The fish remained acceptable for 8 to 9 days in ice. The faecal streptococci decreased to a small extent during iced storage and detectable numbers still survived after 8 to 13 days of iced storage. KAR

Sardines

- 907 Dora (KC) and Hiremath (GG). Effect of chilled sea water storage of oil sardine (*Sardinella longiceps*) on quality changes during frozen storage. *Fishery Technology* 24(2); 1987; 109-111

Oil sardine was kept in (1) chilled sea water (CSW) or with ice (1:1) immediately or after 4 h, and subjected to frozen storage. It was found that oil sardines chilled and preserved in CSW could be

frozen for 5 days and those chilled in CSW and further preserved in 1 C could also be frozen upto 5 days with little or no difference in quality during storage. Sardines chilled and preserved in ice were fit for freezing only upto 2 days. The fish iced after a delay of 4 h could be frozen only up to one day. KAR

Trouts

- 908 Barnett (HJ), Conrad (JW) and Nelson (RW). Use of laminated high and low density polyethylene flexible packaging to store trout (*Salmo gairdneri*) in a modified atmosphere. *Journal of Food Protection* 50(8); 1987; 645-651

The effect on extension of refrigerated shelf life of boned trout, treated or not treated with a 2.3% potassium sorbate dip and packaged in laminated high/low density "semi-permeable" polyethylene bags in the presence of a carbon dioxide-enriched modified atmosphere (MA), was studied. The combination of packaging, refrigeration, and MA was effective in doubling the fresh shelf life of the trout product. Potassium sorbate limited bacterial growth but did not extend shelf life beyond what was obtained with MA alone. Carbon dioxide content in the flesh of the trout appeared to be a function of carbon dioxide in the headspace of the bags which was reduced by about 50% during the first 20 days of storage. Based on changes in organoleptic characteristics, the quality of raw trout, including the potassium sorbate-treated trout, was only marginally acceptable after 25 days of storage in the MA. The max. post-MA refrigerated shelf life of the trout held under the experimental conditions of this study, including those treated with potassium sorbate, was about 1 wk. KAR

Tunas

- 909 Hirano (T), Suzuki (T) and Suyama (M). Changes in extractive components of bigeye tuna and pacific halibut meats by thermal processing at high temperature of F_0 values of 8 to 21. *Bulletin of the Japanese Society of Scientific Fisheries* ('Nihon Suisan Gakkai-shi') 53(8); 1987; 1457-1461 (Ja).

The decrease of the total sugar content was observed during thermal processing, while pH value, Hunter value, degree of browning of extract, and the non-protein nitrogen content increased. Trimethylamine oxide and creatinine changed into trimethylamine and creatinine, resp., almost equivalently free amino acids showed little changes, with histidine decreasing significantly. BV

Fish products

- 910 Kalaimani (N), Unnikrishnan Nair (TS) and Mohanasundaram (M). Incidence of arthropods in dried fish products. *Fishery Technology* 24(2); 1987; 93-95

Arthropods were observed in insect infected dried fish products stored for 8-20 wk in the laboratory. The insects identified included *Suidesia nesbetti* Hughes (Acaridae) in dried anchovies, *Dermestes ater*

(Dermestidae, Coleoptera) in wet cured sardines and smoked catfish and *Stegobium panicum* in smoked catfish and dried mussel. Incidence of *Stegobium panicum* and *Suidesia nesbetti* in dried fish products have been recorded for the first time. MVG

- 911 Rehbein (H). Determination of the formaldehyde content in fishery products. *Zeitschrift für Lebensmittel-Untersuchung und -Forschung* 185(4); 1987; 292-298

The influence of several parameters on the release and recovery of formaldehyde (FA) in the case of extraction and distillation of fish samples is described. The Nash test and the chromatropic acid assay are compared in regard to their suitability for Fa detn. in fish. BV

- 912 Saisithi (P). Traditional fermented fish products with special reference to Thai products. *ASEAN Food Journal* 3(1); 1987; 3-10

Covers classification of fermented fish products, processing procedures, composition and microbiological properties of traditional fermented fish. BV

Sausages

- 913 Cross Victor Raj (M), Chandrasakhar (TC) and Saralaya (KV). High temperature processing of fish sausage. IV. Heat penetration study. *Fishery Technology* 24(2); 1987; 136-137

Rate of penetration of heat into fish sausage when processing at 115.6 °C was studied. In the test F250 values at the centre were found to be 2.73, 3.72 and 5.29 min when sausages were processed at 115.6 °C for 20, 24 and 30 min resp. Results show that processing of fish sausage at 115.6 °C for 30 min destroys almost all the spoilage organisms thereby prolonging shelf life. KAR

Surimi

- 914 Buisson (DH). Surimi-end use of options for New Zealand. *Food Technology in New Zealand* 22(4); 1987; 38-41

Covers surimi, its properties, quality assessment of surimi, hoki surimi quality, surimi for food proteins, developmental options for NZ surimi, resources available in NZ and surimi marketing standards. BV

Frog legs

- 915 Sang (FC), Hugh-Jones (ME) and Hagstad (HV). Viability of *Vibrio cholerae* O1 on frog legs under frozen and refrigerated conditions and low dose radiation treatment. *Journal of Food Protection* 50(8); 1987; 662-664

Frog legs were contaminated with *Vibrio cholerae* O1, Inaba serotype, EIT biotype. The organism remained viable for more than 28 and

2'd when stored at 02-20 C and 4 C resp. Exposure to a multicurie Cobalt source of 50 and 100 kilorads eliminated *V. cholerae* from both the frozen and fresh frog legs. AS

Mussels

- 916 Gopalakrishna Iyer (TS) and Varma (PRG). Isolation of *Salmonella braenderup* (6, 7:e, h:e, n, z₁₅) from mussel meat. *Fishery Technology* 24(2); 1987; 138

The serotype *Salmonella braenderup* was isolated from a market sample of mussel meat. Its morphological, biochemical and serological characteristics have been enumerated. The biochemical properties were similar to those of typical *Salmonella*. MVG

Prawns

- 917 Chandrasekharan (M), Lakshmanperumalsamy (P) and Chandramohan (D). Spoilage bacteria of *Penaeus indicus*. *Fishery Technology* 24(2); 1987; 122-125

Bacteria from raw (untreated and unprocessed) prawns stored at 28 plus or minus 2 C, 4 C and -18 C were isolated and tested for their spoilage potential, including production of protease, lipase, and amylase, reduction of trimethylamineoxide to trimethylamine, production of off odours from flesh broth and formation of halozone around the colony grown on flesh agar. About 63% of the total isolates were potential spoilers at all the 3 temp., dominant of them being members of *Vibrio*, *Pseudomonas* and *Acinetobacter* groups. KAR

- 918 Pairat Narkviroj and Buckle (KA). Utilization of prawn head powder in oriental prawn crackers. *ASEAN Food Journal* 3(1); 1987; 21-23

This paper aims at the preparation of prawn head powder suitable for inclusion in oriental prawn crackers and to assess the quality and acceptability of the final product. BV

Shellfish

- 919 Rippey (SR), Chandler (LA) and Watkins (WD). Fluorometric method for enumeration of *Escherichia coli* in molluscan shellfish. *Journal of Food Protection* 50(8); 1987; 685-690

The modification and evaluation of the existing APHA-approved MPN procedure to enumerate *E. coli* in shellfish by fluorometric assay. BV

Shrimps

- 920 Mutti (P), Previdi (MP) and Quintavalla (S). Toxicity of various mycotoxins to *Artemia salina*. *Industria Conserve* 62(2); 1987; 127-130 (It).

The sensitivity of brine shrimp (*Artemia salina*) to nine differ-

ent mycotoxins (aflatoxins B1, B2, G1, G2, sterigmatocystin, O-methylsterigmatocystin, patulin, ochratoxin A, citrinin) was tested. The tests were carried out at 25 °C and 30 °C to evaluate a possible effect of temp. on mycotoxin activity. Sterigmatocystin proved the most toxic, with a LD₅₀ of 0.54 µg/ml at 25 °C and 0.26 µg/ml at 30 °C and citrinin the least toxic (LD₅₀ = 380 µg/ml). Aflatoxins B2, and G2, had no effect at all concn. used (less than or equal to 200 µg/ml). AT 30 °C *Artemia salina* proved more sensitive to all of the mycotoxins tested, except citrinin and O-methylsterigmatocystin; its sensitivity both to citrinin and to O-methylsterigmatocystin was in fact nearly the same at 25 °C and 30 °C. AS

PROTEIN FOODS

- 921 Valyasevi (A) and Dhanamitta (S). Development of supplementary food at the home and community level. *ASEAN Food Journal* 3(1); 1987; 33-36

The study concludes that there is a need to increase the intake of fat and to improve the quality of protein in the supplementary diet of Thai infants and young children. BV

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

- 922 Ackermann (R), Winkler (K), Schumann (G) and Reinsch (V). Recycling process for the washing liquor of bottle cleaners in beverages factories-Assessment from the standpoint of hygiene. *Lebensmittelindustrie* 34(1); 1987; 28-32 (De).

The hygienic results of bottle cleaning with and without recycling of the sedimented washing liquors to the bottle cleaning machine were compared statistically by long-time analysis in a beer bottling plant. A lower germ load in every cleaned bottles was stated in the period with recycling of the washing liquor. Thus the satisfactory hygienic conditions of recycling of washing liquor can be proved now by mathematical statistical valuation, too. This fact is important for the wide application of this economically advantageous and environment-saving technology in the beverage industry of the GDR. AS

- 923 Wesenberg (J), Laube (K), Nowak (S) and Heide (M). About the application of the industrial cleaner Trosilin RDF 50 in the range of low temperatures. *Lebensmittelindustrie* 34(1); 1987; 24-27 (De).

Based on systematic large-scale tests, the optimum application parameters of the cleaner and disinfectant Trosilin RDF 50, product of the VEB Chemiekombinat Bitterfeld, for the beverage industry was ascertained. The micorobiological state of the cleaned recycled bottles for beer and soft drinks was examined qualitatively and quantitatively by application of modified analysis methods. AS

Alcoholic beverages

- 924 Donnelly (WJ). Ethanol stability of casein solutions as related to storage stability of dairy-based alcoholic beverages. *Journal of Food Science* 52(2); 1987; 389-393
- 925 Junge (C). Determination of density, alcohol content, and extract in alcoholic beverages. *Journal of the Association of Official Analytical Chemists* 70(6); 1987; 1089-1090

Ciders

- 926 Leguerinel (I), Cleret (J-J), Bourgeois (C-M) and Mafart (P). Tentatives of sensory evaluation of ciders by instrumental analysis. *Sciences des Aliments* 7(2); 1987; 223-239 (Fr).
- 927 Salih (AG), Drilleau (J-F), Divies (C) and Lenzi (P). Factors contributing to the control of the malolactic fermentation in cider. *Sciences des Aliments* 7(2); 1987; 205-221 (Fr).

The factors controlling the action of lactic acid bacteria in cider relating to malolactic transformation (TML) and a lactic acid bacterial spoilage (production of D-lactate) are reported in this study. The interaction of the amount of inoculum of lactic acid bacteria and the phenolic compounds has significant effect on the delay of TML and on the lactic acid bacterial spoilage. The greater the phenolic content and the smaller the amount of lactic acid bacteria, the longer the delay of TML. The lactic acid bacterial spoilage appeared when there was a high concn. of lactic acid bacteria and a low level of phenolic compounds. BV

Wines

- 928 Aguilar (MV), Martinez Para (MC) and Masoud (TA). Effect of alcoholic fermentation on arsenic species content. *American Journal of Enology and Viticulture* 38(4); 1987; 282-286

Amounts and chemical form of arsenic in musts and wines and the change, that occur during fermentation were studied. The analysis and speciation of arsenic was carried out with an ion exchange column combined with hydride generation atomic spectrometry. MVG

- 929 Caputi (AJr) and Walker (DR). Titrimetric determination of carbon dioxide in wine: *Journal of the Association of Official Analytical Chemists* 70(6); 1987; 1060-1062

The method tested in this collaborative study comprises of addition of 50% NaOH to adjust the samples to pH 10-11 and titrate with a standard solution in presence of carbonic anhydrate. The titer between pH 8.6 and 4.0 is recorded and the equivalent titer of a degassed sample is of the same wine is subtracted as a blank. The difference is used to calculate carbon dioxide content of the samples. The carbonic anhydrase added prior to degassing is to catalyse the reaction carbonic anhydrase = carbon dioxide + water. The results in-

licated that blank values are as much as 1% lower instead of degassing blank samples, than adding the enzyme after pH adjustment with NaOH. MVG

- 930 Crapisi (A), Nuti (MP), Zamorani (A) and Spettoli (P). Improved stability of immobilized *Lactobacillus* sp. cells for the control of malolactic fermentation in wine. *American Journal of Enology and Viticulture* 38(4); 1987; 310-312
- 931 Ingledew (WM), Magnus (CA) and Patterson (JR). Yeast foods and ethyl carbamate formation in wine. *American Journal of Enology and Viticulture* 38(4); 1987; 332-335
- 932 Junge (C). Determination of malic acid, lactic acid, citric acid, sodium, potassium, magnesium, calcium and chloride in wine. *Journal of the Association of Official Analytical Chemists* 70(6); 1987; 1087-1089
- 933 Lonvaud-funel (A), San-Romao (V), Joyeux (A) and Chauvet (S). Effect of certain grape-parasitic fungi on the activity of wine lactic acid bacteria (*Leuconostoc oenos*). *Sciences des Aliments* 7(2); 1987; 267-274

According to conditions prevailing at the time of maturation, grape harvests are more or less subject to attack by various grape parasitic fungi. The malolactic fermentability of wines from musts cultured by several species of grape parasitic fungi was different from that of the control. Some inhibitors and activators are synthesized. Their effect depends upon the species and the level of development of the fungi. AS

- 934 Ough (CS) and Crowell (EA). Use of sulphur dioxide in winemaking. *Journal of Food Science* 52(2); 1987; 386-388, 393

In this investigation the effect of pretreatment of the grape juice with air, blackening the juice with nitrogen or pretreatment with sulphur dioxide was studied with ten juices of common wine grape cvs. Further treatment with sulphur dioxide was made later at intervals the results showed that pretreatment with aeration decreased the colour in the wine compared to nitrogen blackening. It was also seen that pretreatment with sulphur dioxide was more effective in decreasing the colour than later treatment with sulphur dioxide and without sulphur dioxide treatment were generally less liked and pretreatment helped preserve good colour and quality whereas later treatment is necessary for improving and maintaining quality; sulphur dioxide additions seems to control the oxidation of the juice. NGKR

- 935 Rodriguez (SB). A system for identifying spoilage yeast in packaged wine. *American Journal of Enology and Viticulture* 38(4); 1987; 273-276

A method for the classification of wine yeasts based on growth response on pantothenate-free agar, and two other agar media, sodium chloride-YM and cyclohexamide-UBA has been reported. Results show that the spoilage potential of yeast from packaged wine can be predicted by its growth response on these media. MVG

- 936 Suresh (ER) and Ethiraj (S). Effect of grape maturity on the composition and quality of wines made in India. *American Journal of Enology and Viticulture* 38(4); 1987; 329-331

Sherry

- 937 Martinez de la Ossa (E), Caro (I), Bonat (M), Perez (L) and Domecq (B). Dry extract in sherry and its evolution in the aging process. *American Journal of Enology and Viticulture* 38(4); 1987; 321-325
- 938 Martinez de la Ossa (E), Perez (L) and Caro (I). Variations of the major volatiles through aging of sherry. *American Journal of Enology and Viticulture* 38(4); 1987; 293-297

Non-alcoholic beverages

Coffee

Caffeine

- 939 Kitts (DD) and Shekhtman (K). Chronic dose dependent effects of caffeine in pregnant rats. *Canadian Institute of Food Science and Technology Journal* 20(4); 1987; 273-278

The potential fetotoxic effects of caffeine, administered by oral gavage to time pregnant rats was studied during days 6 to 20 of gestation. Caffeine dosages from 0, 5, 10, 20, 50 and 100 mg/kg/day were used. There were no statistically significant differences noted in the maternal food consumption, gestational wt. gain, or conceptus growth and development at caffeine levels equal to or below 10 mg/kg, compared to the control group. Dams treated with 20 and 50 mg/kg/day caffeine, resp. exhibited significantly ($P < 0.05$) reduced food intake during early to midgestation, which returned to levels observed in control animals near term. Caffeine had no significant effect on post implantation embryo toxicity or the incidence of gross fetal abnormalities at levels ranging from 5 to 50 mg/kg/day. A significant reduction in maternal food intake throughout the entire gestation period and litter size was only observed in animals receiving caffeine at the highest dose of 100 mg/kg/day. KAR

Fruit juices

- 940 Kneip (K). Frozen block cutting machines in fruit juice plants. *Flussiges Obst* 54(7); 1987; 371-372

Briefly discusses the advantages of frozen block cutting machines, hygiene, product quality, energy consumption and costs. Advantages indicate that the raw materials can be processed within 1-2 days upon arrival, reduction in storage costs, reduction in labour costs for processing due to easy handling, urgent orders can be shipped on time, the risk of having spoiled products due to high bacterial contamination can be reduced significantly since the raw materials are processed at the same condition as they are being received. BV

- 941 Van Nistelrooij (M). Freeze concentration and its applications in the food industry. *Flussiges Obst* 54(7); 1987; 372-375

This paper discusses history of freeze concn.; the Grenco freeze concn., process-concn., crystallization, ripening; latest development; energy consumption; the application of freeze concn. process in fruit juice industries (orange juice, grapefruit juices and mandarin juice) breweries and dairy industries and economics of freeze concn. plants. BV

Blackberry juices

- 942 Georgilopoulos (DN) and Gallois (AN). Volatile flavour compounds in heated blackberry juices. *Zeitschrift fur Lebensmittel-Untersuchung und -Forschung* 185(4); 1987; 299-306

Alcohols, furans and aldehydes are the predominant volatile flavour compounds in all kinds of heated juices. 2-Heptanol was found to be the most abundant compound in cultivated variety and furfural in the wild blackberry var. No changes in odorous profile was noticed with the addition of 50% (W/W) sugar during heat treatment. BV

Guava juices

- 943 Padula (M) and Rodriguez-Amaya (DB). Changes in individual carotenoids and vitamin C on processing and storage of guava juice. *Acta Alimentaria* 16(3); 1987; 209-216

To gain an insight of the degradation of different carotenoids in processed fruits, changes in individual pigments were followed on thermal processing and storage of guava juice. A significant five-fold increase in *cis*-lycopene (from 1.2 µg per g) was observed on processing. A slight but insignificant decrease in *trans*-lycopene was also observed. Both isomers decreased on storage. The small amount of Beta-carotene (3.7 µg per g) remained unchanged; thus, the vitamin A value was also maintained. No epoxide derivatives of acyclic lycopene were detected either on processing or storage. On the other hand, no *cis*-isomers of bicyclic Beta-carotene and zeinoxanthin were found, but their epoxides were detected. In relation to vitamin C, losses of 11% on processing and 46% after 10 months of storage were observed. AS

Orange juices

- 944 Crandall (PG), Chen (CS) and Davis (KC). Preparation and storage of 72 Brix orange juice concentration. *Journal of Food Science* 52(2); 1987; 381-385

In this investigation studies are undertaken to examine alternative mechanical and enzymatic treatment methods for reducing the viscosity by using existing commercial evaporators to concn. orange juice to 72 Brix to measure the quality of the frozen concn. The samples were stored at 7 or at 4 °C. The samples were blended at monthly intervals to make 41.8 Brix frozen concn. orange juice. The results of evaluation showed that vitamin C retention levels were >

94% after 6 months storage at 4 C. The taste evaluation showed that the product stored well and furfural levels were well below that which indicates off flavours. With storage time and temp. browning also tended to increase. NGKR

Raspberry juices

- 945 Spanos (GA) and Wrolstad (RE). Anthocyanin pigment, nonvolatile acid, and sugar composition of red raspberry juice. *Journal of the Association of Official Analytical Chemists* 70(6); 1987; 1036-1046

Tea

- 946 Maltheis (G), Vitzthum (OG) and Weder (JKP). On the polarographic determination of polyphenol oxidase activity in different teas. *Chemie Mikrobiologie Technologie der Lebensmittel* 11(1); 1987; 1-4

A simple and rapid method for the detn. of polyphenol oxidase (PPO) activity in different teas using a commercial oxygen measuring instrument with a Clark type electrode. Green tea leaves and CTC tea had PPO activities of 10.9 PPO units/g of dry wt. Fermented tea and black tea had no activity or hardly any actual activity. Potential PPO activities (after addition of pyrogallol) of green tea leaves, CTC tea, fermented tea, and black tea were 18.0, 11.2, 5.4, and 0.9 PPO units/g of dry wt. resp. No effect of carbon dioxide on PPO activity could be detected. BV

FATS AND OILS

Fats

- 947 George (G) and Sen (DP). In vitro and in vivo digestibility of blended and corresponding interesterified fats in rats. *FAT Science and Technology* 89(7); 1987; 276-279

The process of interesterification of fat blends namely vanaspati and groundnut oil (40:60) (vanaspati-GNO), sal fat and groundnut oil (30:70) (sal-GNO), sheep tallow and groundnut oil (30:70) (ST-GNO), and cottonseed oil (CSO) was found to bring about limited but consistent increase in in vitro digestibility (compared to starting stocks) during first four h. studied. Apparent digestibility of blends of sal-GNO and vanaspati-GNO in rats was not affected by the process of interesterification while interesterified products had significantly higher in vivo true digestibility compared to starting stocks. AS

- 948 Hartman (L), Lago (RCA), Azeredo (LC) and Azeredo (MAA). Determination of hydroxyl value in fats and oils using an acid catalyst. *Analyst* 112(2); 1987; 145-147

- 949 Leth (T). Changes in the fatty acid content of used frying fat compared with fresh fat. *FAT Science and Technology* 89(7); 1987; 258-260

In 21 samples of used frying fat and the corresponding samples of fresh fat the fatty acid content was determined by capillary GLC on a CP Sil 88 column. The content of both saturated and unsaturated fatty acids as well as the content of total fatty acid are decreased by frying. Both the decrease in linoleic acid and the decrease in total fatty acid correlate well with % polar compounds as fat quality evaluation criteria. No isomers of cis, cis-linoleic acid are formed during the frying process. The content of C18 is increased during the frying process from about 0 to 8 g/100 g in average to 2.3 g/100 g, which means that the frying process must be considered as sources to the human intake of trans fatty acid. AS

- 950 Seher (A) and Arens (M). Survey by a working party of the DGF, 100th Report: German Standard Methods for investigation of fats, fatty products and related materials, 77th report: Analysis of fats XXIV. *FAT Science and Technology* 89(8); 1987; 307-311 (De).
- 951 Zwierzykowski (W) and Dlugokecki (ZJ). Comparision of interface and emulsifying activities of the derivatives of acetic and acetocitric acids and low-grade monoglycerides. *FAT Science and Technology* 89(7); 1987; 271-275

Application possibilities of low grade monoglycerides for preparation of diglyceride-derivatives of monoglycerides and selected non-fatty acids: acetic and acetocitric acids are described and the characteristics of the products of acylations are presented. BV

Fatty acids

- 952 Gertz (Ch). Determination of cis, cis-9, 12-octadecadienic acid in foods. *FAT Science and Technology* 89(8); 1987; 320-324 (De).

Describes the separation and detn. of geometric and positional isomers of methyl linoleate by HPLC and the method is compared with the capillary gas chromatography. For the detn. of linoleic acid in foods, the fat is isolated with a mixture of dichloromethane-methanol (1:1 v/v) after freeze-drying. BV

- 953 Tahoun (MK). Fatty acid and position specificities of an intracellular lipase from *Geotrichum candidum*. *FAT Science and Technology* 89(8); 1987; 318-320 (De).

Lipase of *Geotrichum candidum* showed max. activity at 35 C and pH 7.5. The enzyme hydrolysed oleic acid glycerol ester bonds on using mono-acid triglycerides (C10:0, C18:0) as substrates. The results indicate that intracellular lipase reveals similar substrate specificity to extracellular enzyme of the same mold species. The isolation and purification of lipase is economically feasible and is of practical importance for the modification of the physical properties of fats and oils. BV

Oils

- 954 Kittur (MH), Mahajanshetti (CS) and Lakshminarayana (G). Characteristics and composition of some convolvulaceae and leguminosae seeds and the oils. *FAT Science and Technology* 89(7); 1987; 269-271

The seed of *Qumoclit coccinea*, *Ipomaea horsfalliae*, *Argyria aggregata*, *Merremia pentaphylla* (Convolvulaceae), *Indigofera hirsuta*, *Dalbergia melanoxylon* and *Bauhinia vahlii* (Leguminosae) as well as the oil extracted therefrom were analysed for physico-chemical characteristics and composition. The oil content was appreciable in *Q. coccinea* (22.6%), *I. horsfalliae* (19.8%), *A. aggregata* (13.5%) and *D. melanoxylon* (13.8%) seeds. The protein content was high (21.8-26.9) in all except in *M. pentaphylla* and *B. vahlii* seeds. The iodine values ranged from 87.6 to 132.8. The content of unsaponifiable matter was low in all the oils. The predominant fatty acid was linoleic (34.3-59.7%), the other major acids being palmitic (14.4-23.8%) and oleic (6.5-22.1%). Significant quantities of stearic and longer chain saturated acids were also present. AS

- 955 Sunita Joshi and Mathur (JMS). Effect of growth temperature on the physico-chemical characteristics of fungal oil. *FAT Science and Technology* 89(8); 1987; 311-313 (De).

Fusarium oxysporum F. Sp. Lini (Bolley) grown as static surface culture in medium containing 15% glucose and 0.4% ammonium nitrate as sole carbon and nitrogen sources, resp; at optimum pH 5.9 and temp. 28 plus or minus 1 C yield 0.4% biomass of high protein (23.7%) and oil (18.9%) resembling edible palm oil in composition. The fungus has been found to be a potential source for biotechnological production of oil and is of economic importance since it contains appreciable proportions of nutritionally significant unsaturated fatty acids. BV

Corn oils

- 956 Rigby (NM), Price (KR), Coxon (DT) and Fenwick (GR). Effect of soyasaponin I on the oxidation of corn oil and lard. *Journal of the Science of Food and Agriculture* 40(2); 1987; 157-164

The antioxidant activity of soya saponin I added to corn oil (100 and 1000 mg/kg⁻¹) and lard (567 mg kg⁻¹) has been examined. In corn oil oxidised at 180 C there was no effect as measured by both thiobarbituric acid values and the loss of unsaturated fatty acids. Whereas the same oxidised at 40 C no effect was observed. Similar effect was also seen in lard to which soyasaponin I was added by measurement of rancidity at 100 C there by proving that saponin does not possess any antioxidant role. NGKR

Cottonseed oils

- 957 Soliman (MA), El-Shattory (Y), Fadel (HM) and Aly (SM). Heated fats. II. Chemical flavour changes in fat subjected to frying processes. Edible oil (cottonseed). *Crasas Y Aceites* 38(1); 1987; 15-19

The effect of continuous heating of oil for several h (35.5 h with and without tempering) on the chemical characteristic (peroxide, acid and iodine values) were determined under practical conditions. The results obtained indicated that peroxide, iodine and acid values increased by continuous heating. Frying of oils treated by tempering gave the same trend. Also the effect of heating process on the developing flavour was studied. An obvious change was observed in the volatile components, in particular propanal and 2-hexanol increased, reaching 21.43%, 36.5% resp. after 35.5 h. Concerning the flavour of the same oil after tempering, the short chain aldehydes showed a remarkable decrease after heating for 35.5 h while the esters showed max. increase by heating for 35.5 h. AS

Palm oils

- 958 Bhattacharyya (DK), Majumdar (S), Roy (S) and Basu (R). Margarines from palm oil and its fractions. *Oleagineux* 42(6); 1987; 253-258

Margarines can be readily produced from the interesterified fat products obtained from palm oil, palm oil mixed with soybean oil, palmolein, palmstearin mixed with liquid oils like soybean, rapeseed and ricebran by emulsification using 1.20p. 100 moisture, monoglyceride and within and salt. The products are somewhat softer than the proprietary butter specimens but resemble in both appearance (texture) and spreadability. AS

- 959 See (LL) and Timms (RE). Use of palm kernel olein as a frying oil. *ASEAN Food Journal* 3(1); 1987; 11-16

The properties of palm olein and palm kernel olein (PKOL) blends are reported. The addition of silicone as antifoaming agent for controlling the foam during deep frying was studied. Results of this study showed that addition of 2 p.p.m silicone to the palm kernel oleins improves its stability significantly to better than coconut oil. PKOL with the addition of silicone, can satisfactorily replace coconut oil in all industrial and domestic frying, with a 10-20% cost saving. A blend of 50% PKOL + 50% coconut blend showed excessive foaming during frying which was unaffected by the addition of 2 p.p.m silicone. The blend was considered unsuitable for deep frying, but was satisfactory for shallow frying and also for spraying savoury crackers and snack foods. BV

SPICES AND CONDIMENTS

Spices

- 960 Elsgruber (H) and Reuter (G). Anaerobic spore-formers in commercial spices and ingredients for instant foods. *Zeitschrift fur Lebensmittel-Untersuchung und -Forschung* 185(4); 1987; 281-287 (De).

Hundred and fifteen commercial food products were investigated

for anaerobic spore-formers (*Clostridium perfringens*). Twenty one samples of the 70 commercial spices, 7 of the 30 instant food samples and 12 of the 15 meat extracts reported to be Clostridia-positive. The low counts ranged between 3×10^0 and 10^{-3} cells/g, in most cases (2/3) in the range 10^1 to 10^2 g only in 6 cases more than 10^2 Clostridia/g were detected. 43 of the 73 isolates were *C. perfringens*. Three of the 23 *C. perfringens* were heat resistant. Commercial spices, meat extracts, and instant foods must be handled with care in the kitchen because an increase in the number of clostridia could lead to food intoxication. BV

Chillies

- 961 Gopalakrishnan (N), Narayanan (CS) and Mathew (AG). Colour concentrate from Indian chilli oleoresin. *Indian Spices* 24(2-3); 1987; 19-21

Chilli oleoresin can be separated into two fractions, the high pungency fraction containing the capsaicin present in total oleoresin and chilli colour fraction (CCF) which is devoid of pungency but rich in colouring matter. The CCF was obtained by fractionation of chilli oleoresin; it was saponified followed by extraction of colourants using organic solvents. The products obtained have significantly high colour values and was solid in nature. MVG

- 962 Khadi (BM), Goud (JV) and Patil (VB). Variation in ascorbic acid and mineral content in fruits of some varieties of chilli (*Capsicum annum* L.). *Qualitas Plantarum - Plant Foods for Human Nutrition* 37(1); 1987; 9-15

The results of the present study indicate a significant genetic variation in ascorbic acid (AC) content in green and ripe chilli and mineral content in dry chilli. AC content in ripe fruits (11 var.) was higher than in green fruits of chilli. Correlation analysis showed that number of days fruit to ripening, fruit surface area, fruit length, dry and fresh fruit yield, AC content in green fruits, Fe, Cu, Mg, Ca content in dry fruits are important traits which influence the content of AC in ripe fruits. BV

Thyme

- 963 Bengilali (B), Hammoumi (M), M'Hamedi (A) and Richard (H). Essential oil composition of different Moroccan thyme varieties. 2. Principal component analysis. *Sciences des Aliments* 7(2); 1987; 275-299 (Fr).

Tamarind

- 964 Askar (A), El-Nemr (SE) and Siliha (H). Aroma Constitutents of Egyptian Tamarind pulp. *Deutsche Lebensmittel-Rundschau* 83(4); 1987; 108-110

SENSORY EVALUATION

- 965 Fischman (EI), Shinholser (KJ) and Powers (JJ). Examining methods to test factor patterns for concordance. *Journal of Food Science* 52(2); 1987; 448-450, 454
- 966 Lynch (NM). In search of the salty taste. *Food Technology* 41(11); 1987; 82-83, 85-86
- Discusses mechanisms for salt taste perception and problems in developing salt alternatives. Evaluation of salt substitutes in oat-meal, theories of saltiness, lessening desire for salt are also highlighted. BV
- 967 Mclellan (MR), Hoo (AF) and Peck (V). A low cost computerised card system for the collection of sensory data. *Food Technology* 41(11); 1987; 66, 68-72
- 968 Peters (D). Power, Influence and group dynamics in sensory evaluation. *Food Technology* 41(11); 1987; 62, 64-65

FOOD STORAGE

- 969 Poeschel (W) and Kiener (W). Calculation of time-dependent and temperature-dependent changes of quality during freeze-storage of foodstuffs. *Lebensmittelindustrie* 34(1); 1987; 7-10

INFESTATION CONTROL AND PESTICIDES

Pesticides

- 970 Delobel (A) and Malonga (P). Insecticidal properties of six plant materials against *Caryedon serratus* (OL.) (Coleoptera: Bruchidae) *Journal of Stored Products Research* 23(3); 1987; 173-176

The effectiveness against *Caryedon serratus* of powders of *Tephrosia vogelii* (a known source of rotenone) and of 5 other plants traditionally used in the Congo to protect groundnuts has been studied and results of application rates of 1:40 W/W, *Chenopodium ambrosioides* and *T. vogelii* affected the survival of *C. serratus* adults, 90.0 and 98.8% dying within 13 days resp. Other plant materials were not found to be effective on the different stages of the insect. NGKR

BIOCHEMISTRY AND NUTRITION

Biochemistry

- 971 Zsinka (AJN), Foldes (V) and Peredi (J). Certain serum and liver lipid parameters as affected by different fat mixture. *Acta Alimentaria* 16(3); 1987; 225-230

Groups of 20 sexually mature male Wistar rats (National Institute of Food Hygiene and Nutrition, OETI) were fed isoenergetically during 6 wk on normal synthetic diet containing 20% edible fat or fat mixture of different P/S ratio and fatty acid of different chain length. Effect of the diet on the serum and liver lipids was investigated and the following conclusions were drawn: Depending on the kind of fat given significant differences were not observed among the serum lipid levels as compared to the values in control rat fed with normal ratio(5% fat); The total lipid, total cholesterol and triglyceride content of the liver was significantly increased in rats fed a diet with 20% sunflower oil. On the effect of fats of similar quantity containing different medium chain triglycerides (MCT) such as: coconut oil rich in C_8 , C_{10} , C_{12} MCT, P/S = 0.03; mixture of 67% coconut oil + 33% sunflower oil P/S = 0.82; mixture of 67% oil rich in C_8 , C_{10} MCT + 33% sunflower oil P/S = 0.33; generally decreased the quantity of liver total lipid and triglyceride contents. The free fatty acid content of the liver diminished significantly as an effect of coconut oil rich in C_8 , C_{10} , C_{12} MCT and of the fat mixtures. Upon feeding the rats on fat mixture rich in C_8 , C_{10} MCT the free fatty acid content of the liver was in accordance with the control values. The total liver lipid content was significantly lower upon consumption of the fat mixture rich in C_8 , C_{10} MCT than with the mixture containing C_8 , C_{10} , C_{12} MCT of the more advantageous P/S ratio. AS

- 972 Zsinka (AJN), Foldes (V) and Peredi (J). Certain serum and liver lipid parameters as affected by edible fats of different quantity and quality. *Acta Alimentaria* 16(3); 1987; 217-223

Groups of 20 sexually mature male Wistar rats (National Institute of Food Hygiene and Nutrition, OETI) each were fed synthetic rations containing 5% or 20% edible fat of different P/S ratio (sunflower oil, lard, coconut oil), otherwise of equal nutritive value. The diet was given during 6 wk isoenergetically. The total lipid, triglyceride, total cholesterol and free fatty acid content of the serum and the liver was determined and the following conclusions were drawn: on feeding with normal synthetic diet of adequate (5%) fat content the lipid parameters tested did not change as an effect of fats of different fatty acid composition (P/S ratio); On feeding a diet of high fat content (20%) the diet containing sunflower oil of high P/S ratio reduced the total lipid and triglyceride level of the serum in relation to the diet of 5% fat. At the same time the total lipid, total cholesterol and triglyceride content of the liver increased about two fold. Lard and coconut oil did not cause a similar changes. AS

Proteins

- 973 Gassmann (B), Kroll (J) and Cifuentes (S). Determination of foaming properties of proteins. *Nahrung* 31(4); 1987; 321-330 (De).

Foaming properties measured suggested that only the new laboratory whipping principle reflects the actual performance of protein based whipping agents and that it is far better adapted to large-scale processing than the laboratory equipment most commonly used. Optimum foam forming need distinct rotation speeds and stirring times as well as pH values typical for each product. In creating sugar containing protein foams with a high degree of aeration however in no case of laboratory operational conditions the amount of energy and air available for whipping was sufficiently large. Because of the advantages of the new whipping principle over the otherwise tested ones the motor output and the stirring conditions now are being improved. KAR

- 974 Porrata-Maury (C), Aust (L), Noack (R) and Eschrich (H). Studies on the postprandial thermogenic action of proteins and protein mixtures in rats. *Nahrung* 31(4); 1987; 311-319 (De).

The postprandial thermogenic action of different proteins and their mixture dependent on their biological value was estimated in rats by indirect calorimetry with special reference to the reproducibility of the evaluation of the postprandial metabolic rate. The absolute thermogenic action (related to the food energy intake) of casein, white egg protein and gelatine, fed in combination with wheat starch (1:1), amounted to 11.4%, 14.5% and 17.8% resp. Mixture of casein with gelatine (ratio 1:1 and 1:2) as well as the mixture of casein with glycine (in such amount as in the casein-gelatine mixture of 1:1) lead to a postprandial thermogenic action of 16.1%, 19.2% and 14.5% resp. If proteins of distinctly different biological value are compared an inverse correlation to their postprandial thermogenic action can be demonstrated which reflects partly theoretical approaches to the ATP yielding capacity, calculated from the amino-acid pattern of the proteins and their mixtures. AS

Nutrition

Vitamin C

- 975 Bendich (A). Vitamin C and immune responses. *Food Technology* 41(11); 1987; 112-124

Discusses the role of vitamin C for both the nonspecific and specific components of immune responses. BV

- 976 Borenstein (B). The role of ascorbic acid in foods. *Food Technology* 41(11); 1987; 98-99

Briefly covers the use of ascorbates in cured meats, fruits and vegetables, brewed products and effects in digestive tracts. BV

- 977 Liao (ML) and Seib (PA). Selected reactions of L-ascorbic acid related to foods. *Food Technology* 41(11); 1987; 104-107, 111
- 978 Sato (PH), Rosenberg (JM) and Hadley (KB). Vitamin C deficiency disease as a model for development of an enzyme administration protocol. *Food Technology* 41(11); 1987; 100-103, 111

TOXICOLOGY

- 979 Prelusky (DB), Hamilton (RMG), Foster (DBC), Trenholm (H) and Thompson (BK). Optimization of chick embryo toxicity bioassay for testing toxicity and potential of fungal metabolites. *Journal of the Association of Official Analytical Chemists* 70(6); 1987; 1049-1055
- 980 Shahid (SMB), Siong (TE) and Hin (CY). Lead content of some Malaysian Foodstuffs. *ASEAN Food Journal* 3(1); 1987; 25-29
- 981 Siegel (T). Index of where to find basic evaluation data of heavy metals in food, cosmetics and every-day utensils. (2nd supplement 1986) *Deutsche Lebensmittel-Rundschau* 83(4); 1987; 113-120 (De).
- 982 Vieths (S), Blass (W), Fischer (M), Krause (C), Mehlitz (I) and Weber (R). Contamination of foodstuffs by emission of tetrachloroethene from a dry cleaning unit. *Zeitschrift für Lebensmittel-Untersuchung und -Forschung* 185(4); 1987; 267-270 (De).

Tetrachloroethene (perchloroethylene) and other volatile organic compounds were found in food from a vacuum cleaner in a home situated above a dry-cleaning unit. The concn. were found to be extremely high in food rich in fat. The analytical procedure for the above-mentioned samples is discussed. BV

Fungi

Aspergillus nidulans

- 983 Ogundero (VW). Proteolysis by toxigenic *Aspergillus nidulans* from Nigerian palm produce. *Nahrung* 31(4); 1987; 285-290 (De).

The submerged cultures of *Aspergillus nidulans* had optimal growth and protease production at 37 °C and within 6 days of incubation. A rapid drop in pH of the growth medium from 6.9 to 4.8 and a subsequent gradual rise was recorded with the period of incubation. The acid-protease produced was purified by a combination of ethanolic precipitation, ultrafiltration and fractionation on DEAE-cellulose and Sephadex G-200. A single peak showing protease activity was subsequently obtained with a 16 fold increase in specific activity and a recovery value of 36%. The purified enzyme had optimal activity on casein and gelatin at pH 5.4 and a temp. of 40 °C. AS

Mycotoxins

Aflatoxins

- 984 Obidoa (O) and Okoro (DC). Effect of short term ingestion of *Telfaria occidentalis* (fluted pumpkin) on the liver. I. Microsomal interactions with aflatoxin B₁. *Qualitas Plantarum - Plant Foods for Human Nutrition* 37(1); 1987; 77-83

Four groups of female mice (18-22 g) were fed for at least 10 days on a control diet or diets with added *Telfaria occidentalis* (10% W/W) vegetables. Group 1 were the control animals. Group 2 were fed the vegetables diet alone. Group 3 were fed the control diet and injected with aflatoxin B₁ (AFB₁, 0.35 mg/kg/day) in the last 3 days. Group 4 were fed with the vegetable diet and similarly treated for 3 days with AFB₁. No effects attributable to treatment were encountered in body wt. food intake, water intake and relative liver wt. (g/100g body wt.) Decreases (17-40%) in PB sleeping time in the vegetable fed animals were not significant ($P > 0.05$) in comparison to the control. Microsomal proteins increased by 2 fold in group 2 but were apparently normal in groups 3 and 4. In group 2 the activities of liver microsomal glucose-6-phosphatase and NADH-cytochrome c reductase increased but those of NADPH-cytochrome c reductase and aniline hydroxylase decreased. Increases were observed in the activities of all of these enzymes in groups 3 and 4. The highest increases were observed in glucose-6-phosphatase activity in mice fed the vegetables and also injected with AFB₁. AS

- 985 Zaika (LL) and Buchanan (RL). Review of compounds affecting the biosynthesis or bioregulation of aflatoxins. *Journal of Food Protection* 50(8); 1987; 691-708

Reviews the literature related to compounds for their ability to inhibit growth and/or aflatoxin production by *Aspergillus flavus* and *A. parasiticus*. Covers structure of aflatoxins B₁ and G₁, biosynthesis of aflatoxin B₁ and substances (dichloroacetic acid, tridecanones, selenites, nitrate, ethylene, benzoic acid, oxygen, azide, epoxy derivatives, peroxy derivatives, halomethanes, rubratoxin B, sorbic acid, BHA, ethoxyquin, potassium sulphite, potassium fluoride, trace metals, and caffeine) affecting aflatoxin production. BV

FOOD LAWS AND REGULATIONS

Nil

GENERAL

Nil

FOOD PROCESSING

- 986 Farkas (J). Decontamination including parasite control of dried, chilled and frozen food by irradiation. *Acta Alimentaria* 16(4); 1987; 351-384

Reports the problems related to food contaminated by biological agents, radiation decontamination of chilled and frozen food of animal origin, reduction of pathogenic microorganisms in poultry and meat, reduction of potentially pathogenic microorganisms in fishery products, elimination of enteropathogenic bacteria from egg products, effect of radication on the microflora in foods of animal origin, and parasite disinfection in foods of animal origin; radiation decontamination of dry ingredients, spices, herbs and dehydrated vegetables seasonings, dehydrated vegetables, dry mixes and cereal products, dried egg and protein preparations, thickening and gelling agents, other ingredients and processing acids and irradiation of dry ingredients as an emerging commercial technology; increased sensitivity of the residual microflora surviving radiation treatment and microbiological safety of decontaminated foods; packaging of radiation disinfected food; and legislative status of radiations decontaminated food. BV

FOOD PACKAGING

Packaging materials

Plastics

- 987 Kwapong (OY) and Hotchkiss (JH). Comparative sorption of aroma compounds by polyethylene and ionomer food contact plastics. *Journal of Food Science* 52(3); 1987; 761-763, 785

Sorption of aroma by three common food packaging plastics in an aqueous system was investigated. All plastics, (LDPE and 2 ionomers), exhibited similar sorption behavior. Equilibrium partition coeff.(K_e), ranged between 2 and 38 for benzaldehyde, citral and ethyl butyrate. A K_e of 3.4×10^3 for limonene indicated a strong affinity for the plastic phases. An equation was derived using K_e to predict

the extent of sorption from a given aroma-plastic system. Sorption isotherms were measured at three temp. for limonene in a model system. A comparison of limonene sorption alone and from orange oil, showed similar patterns, with a lower K_e , for orange oil. Triangle test results indicated that the sorption was detectable to the human senses. AS

Tinplate

- 988 Hardy (KM) and Davis (DR). Corrosion characteristic of soldered side-seam tinplate and welded side-seam ECCS plate cans using organic acid model systems. *Journal of Food Science* 52(3); 1987; 777-780

Investigates the aggressiveness of selected organic acids and the relation of initial pH, nitrate and storage temp. to interior can corrosion in canned model systems, the effect of selected organic acids on interior can corrosion in welded ECCS plate cans as compared to soldered tin plate cans; and the effect of selected organic acids and the relation of initial pH, nitrate and storage temp. in the solubilization of lead from soldered side seams in canned model systems. BV

FOOD ENGINEERING AND EQUIPMENT

Engineering

- 989 Lovric (T), Pillizota (V) and Janeković (A). DSC study of the thermophysical properties of aqueous liquid and semi-liquid foodstuffs at freezing temperatures. *Journal of Food Science* 52(3); 1987; 772-776

Differential scanning calorimetry (DSC) was used to study the thermophysical properties and phenomena occurring in aqueous liquid and semi-liquid foodstuffs (fruit juice conc.) sauces, soups and spinach puree). The phase transitions such as glass transition, irruptive recrystallization (devitrification), ante melting transition and melting are faithfully reflected by DSC curves. These phenomena as well as thermophysical properties (temp. and heat of phase transition, specific heat) depend both on the water content and on the nature of the polydispersion system i.e. on the specific chemical composition. BV

- 990 Mohr (K-H). Quality-saving drying by computer simulation. *Lebensmittelindustrie* 34(4); 1987; 151-152 (De).

- 991 Pham (QT). A converging-front model for the asymmetric freezing of slab-shaped food. *Journal of Food Science* 52(3); 1987; 795-800

In food freezing situation where heat flows at different rates from the two surfaces of a slab, a Plank-type converging-front model enabled the position of the thermal center and hence the freezing time, to be calculated. The thermal center was defined as the point where the freezing fronts meet, i.e.; the last point to cross the

"mean freezing temperature". Finite-difference calculation showed that this model successfully accounted for the effect of asymmetry in heat transfer coeff. or coolant temp. and enabled previously developed simplified prediction methods to be applied to asymmetric situations. AS

- 992 Wu (CH), Russell (G) and Powrie (WD). Paramagnetic behaviour of model system melanoidins. *Journal of Food Science* 52(3); 1987; 813-816, 822

Three model systems (glucose/glycine, glucose/glutamine, and glucose/lysine) were prepared by heating the solution (1 M each, pH 9) at 121 °C for 15 -240 min. Multispecies of paramagnetic signals were found in each of the three systems, probably due in part to free radical structures. The melanoidins of each system were extracted and fractionated and the electron spin resonance spectra of the fractions were obtained and compared. BV

Equipments

- 993 Saguy (I) and Drew (B). Statistical calibration of instruments using water activity determination as an example. *Journal of Food Science* 52(3); 1987; 767-771

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

Chemistry

- 994 Bratakos (MS), Zafiropoulos (TF), Siskos (PA) and Ioannou (PV). Selenium in foods produced and consumed in Greece. *Journal of Food Science* 52(3); 1987; 817-822

The total selenium within a wide var.(315 food items) of Greek foods was determined fluorimetrically. Rich selenium sources were the proteinaceous foods such as fish, meat, bread, and spaghetti. Butter, oils, vegetables, and fruit were poor sources. The selenium content of Greek foods was lower than that of many other countries and resembled more closely that of British foods. From available food consumption data, it was estimated that the daily selenium intake of Greeks was 100 µg. AS

- 995 Shaoul (O) and Sporns (P). Hydrolytic stability at intermediate pHs of the common purine nucleotides in food, inosine-5'-monophosphate, guanosine-5'-monophosphate and adenosine-5'-monophosphate. *Journal of Food Science* 52(3); 1987; 810-812

- 996 Wever (J). Content of sulphite in foods and its loss through cooking. *Zeitschrift fur Lebensmittel-Untersuchung und -Forschung* 185(6); 1987; 457-460 (De).

Eighty six samples were analysed. Results indicated frequent cooking of foods results in significant loss in sulphites. BV

Chemistry(Analytical)

- 997 Briozzo (J), Basualdo (RN), Carrera (PA), Alzamora (SM) Chirife (J). Improvement of thiamine retention in canned low-acid foods through pH adjustment. *Journal of Food Science* 52(3); 1987; 827, 829

The effect of pH adjustment, in the range 5.0-6.9, on the thiamin retention after thermal processing of canned pea, corn, pork and beef liver purees was studied. In all foods tested, reduction of pH, in the range studied, dramatically increased the retention of thiamin after processing. Retention of thiamin in processed pea and corn purees adjusted to pH 5.6 increased by 95% and 63%, resp. as compared to samples having normal pH (6.9 for pea and 6.5 for corn). AS

- 998 Changling (Y), Bing (F), Yugin (JS) and Zhijing (H). Determination of total glucosinolates in cruciferous seeds by semimicro-gravimetry and spectrophotometry with tetrachloropalladate. *FAT Science and Technology* 89(9); 1987; 342-345

For the detn. of the glucosinolate content in cruciferous seeds by spectrophotometry with tetrachloropalladate it is necessary to classify the samples according to their different absorption spectra of the corresponding Pd-complexes into groups. Standard samples are recommended for the preparation of the different calibration curves, which have to be analysed by photometry as well as by a reference method. In order to eliminate the influence of the colour of the extracts and the Pd-reagent solution of the analytical results double-cell blank cuvettes have been used. A modified gravimetric method on a semimicro scale was employed as reference method. This latter method is recommended as sole procedure if only few samples have to be analysed. Using the proposed alterations of the Pd-method improvements of the accuracy and the precision of the results and the sensitivity of the method can be achieved. AS

- 999 Demertzis (PG), Kontominas (MG) and Gilbert (SG). Gas chromatographic determination of sorption isotherms of vinylidene chloride on vinylidene chloride copolymers. *Journal of Food Science* 52(3); 1987; 747-750

A simple procedure for obtaining sorption isotherms from chromatographic peak shapes was applied to poly (vinylidene chloride-vinylchloride 80:20) and poly (vinylidene chloride-acrylonitrile 80:20) surfaces using vinylidene chloride as sorbate. Absolute values of the isosteric heat of adsorption (at constant uptake) increased with decrease in the amount of vinylidene chloride adsorbed, indicating a stronger monomer-polymer interaction at lower monomer concn. Absolute values of Gibb's free energy of adsorption increased with decrease in monomer concn. and temp. indicating a more favourable

monomer-polymer interaction at low temp. and monomer concn. Data under present experimental conditions correspond to a strong thermodynamic polymer/monomer interaction leading to a substantially limited migration of monomer from a polymeric package into a food contacting medium. AS

- 1000 Vaessen (HAMG) and Van Ooik (A). Collaborative test of the fluorimetric determination of selenium in a test solution, milk powder and bovine liver. *Zeitschrift fur Lebensmittel-Untersuchung und -Forschung* 185(6); 1987; 468-471

FOOD MICROBIOLOGY AND HYGIENE

Alcohols

- 1001 White (MJ), Hammond (RC) and Rose (AH). Production of long-chain alcohols by yeasts. *Journal of General Microbiology* 133(8); 1987; 2181-2190

Synthesis of long-chain alcohols by several yeasts in media containing glucose as the carbon sources is reported. MVG

Enzymes

- 1002 El-Refai (AA), Atta (MB) and Harras (AM). Studies on macerating enzymes. 1. Separation and purification of endopolygalacturonase from *Rohment P* using preparative isoelectric focusing. *Chemie Mikrobiologie Technologie der Lebensmittel* 11(3); 1987; 65-73

Ethyl alcohol

- 1003 Ingram (LO), Conway (T), Clark (DP), Sewell (GW) and Preston (JF). Genetic engineering of ethanol production in *Escherichia coli*. *Applied and Environmental Microbiology* 53(10); 1987; 2420-2425

The genes encoding essential enzymes of the fermentative pathway for ethanol production in *Zymomonas mobilis*, were inserted into *Escherichia coli* under the control of a common promoter. Alcohol dehydrogenase II and pyruvate decarboxylase from *Z. mobilis* were expressed at high levels in *E. coli*, resulting in increased cell growth and the production of ethanol as the principal fermentation product from glucose. These results demonstrate that it is possible to change the fermentation products of an organism, such as *E. coli* by the addition of genes encoding appropriate enzymes which form an alternative system for the regeneration of NAD^+ . AS

- 1004 Jaleel (SA), Srikantha (S), Ghildyal (NP) and Lonsane (BK). Recycle of stillage in the production of ethanol from cassava fibrous waste. *Process Biochemistry* 22(3); 1987; 83-84

The recycle of stillage for the extraction of reducing sugars and dextrans from the residue left after the pressing of acid hydro-

lysed cassava fibrous waste pulp resulted in a gain of 363.19g reducing sugars and corresponding additional ethanol when 10 kg residue was extracted with 18.5 dm³ stillage. No adverse effects on alcohol productivity were observed in a 1:1 mix and six recycles at 3:1 ratio of hydrolysate and stillage extract. The technique utilizes about 50% of the stillage produced; the remaining part could be gainfully utilized in the neighbouring molasses-based distilleries for the dilution of molasses. AS

Microorganisms

Bacteria

Lactobacillus acidophilus

- 1005 Hood (SK) and Zottola (EA). Electron microscopic study of the adherence properties of *Lactobacillus acidophilus*. *Journal of Food Science* 52(3); 1987; 791-792, 805

Listeria monocytogenes

- 1006 Datta (AR), Wentz (BA) and Hill (WE). Detection of hemolytic *Listeria monocytogenes* by using DNA colony hybridization. *Applied and Environmental Microbiology* 53(9); 1987; 2256-2259

A fragment of about 500 base pairs of the Beta-hemolysin gene from *Listeria monocytogenes* was used to screen different bacterial strains by DNA colony hybridization. The cells in the colonies were lysed by microwaves in the presence of sodium hydroxide. Of 52 different strains of *Listeria* species screened, only the DNA from Beta-hemolytic (CAMP-positive) strains of *L. monocytogenes* hybridized with this probe. AS

Pediococcus acidilactici

- 1007 Gonzalez (CF) and Kunka (BS). Plasmid-associated bacteriocin production and sucrose fermentation in *Pediococcus acidilactici*. *Applied and Environmental Microbiology* 53(10); 1987; 2534-2538

Propionibacterium

- 1008 Crow (VL). Citrate cycle intermediates in the metabolism of aspartate and lactate by *Propionibacterium freudenreichii* subsp. *Shermanii*. *Applied and Environmental Microbiology* 53(10); 1987; 2600-2602

Salmonella

- 1009 Flowers (RS), Mozola (MA), Curiale (MS), Gabis (DA) and Sillicker (JH). Comparative study of a DNA hybridization method and the conventional culture procedure for detection of *Salmonella* in foods. *Journal of Food Science* 52(3); 1987; 781-785

Staphylococcus aureus

- 1010 Thomas (DJ) and Wagner (MK). Effect of sodium acid pyrophosphate and/or potassium sorbate on *Staphylococcus aureus* FRI-100 growth and toxin production. *Journal of Food Science* 52(3); 1987; 793-794, 800
- 1011 Van netten (P), Mossel (DAA) and Van de Moosdijk (A). Rapid detection of excessive CFU counts of enterobacteriaceae, *S. aureus* and yeasts by nitrate reduction/glucose dissimilation (NGD) monitoring in selective media. *Journal of Food Science* 52(3); 1987; 751-756

A technique was developed for the approximate selective estimation of CFU loads of thermotrophic Enterobacteriaceae and *S. aureus* in foods and meals, relying on the rate of nitrate reduction and glucose dissimilation (NGD test) in lauryl sulphate nitrate glucose broth and modified liquid Baird Parker medium with nitrate and glucose added, resp. both incubated at 42.5 C. Yeast CFU could be assessed similarly in oxytetracycline gentamicin glucose broth at 30 C. The fate of nitrate and glucose was monitored by urinalysis dip sticks. Response times were 7 and 2 hr for CFU levels of 10^5 and 10^7 g⁻¹, resp., allowing feedback to production lines within one working day. The procedure requiring no other instrumentation than a centrifuge, also has been applied successfully as a field test procedure. AS

Streptococcus lactis

- 1012 Woskow (SA) and Kondo (JK). Effect of proteolytic enzymes on transfection and transformation of *Streptococcus lactis* protoplasts. *Applied and Environmental Microbiology* 53(10); 1987; 2583-2587

Fungi

Aspergillus niger

- 1013 Manonmani (HK) and Sreekantiah (KR). Studies on the conversion of cellulose hydrolysate into citric acid by *Aspergillus niger*. *Process Biochemistry* 22(3); 1987; 92-94

The production of citric acid by *Aspergillus niger* (16) was studied using enzymatic hydrolysate of alkali-treated bagasse by solid state fermentation. Saccharification and fermentations were carried out sequentially as well as simultaneously. Conditions for optimum citric acid production using cellulose hydrolysate medium were: sugar concn. 7% (W/W) sodium nitrate; 400 mg nitrogen l⁻¹ medium; potassium dihydrogen phosphate: 0.1% l⁻¹ medium; ethanol: 3% (V/W) 1 ml of 1 x 10⁻² fluoroacetate and coconut oil: 3% (V/W). Simultaneous saccharification and fermentation was found to be suitable for citric acid production; 44% conversion of total reducing sugars to citric acid was obtained in 72 h fermentation by sequential with the above mentioned parameters. AS

Mushrooms

- 1014 Kahn (V) and Andrawis (A). Effect of tiron on monohydroxy and O-dihydroxyphenolase activity of mushroom tyrosinase. *Phytochemistry* 26(10); 1987; 2675-2678

Tiron has a multiple effect on mushroom tyrosinase. At relatively low concn. (up to 3.3 mM), Tiron extended the lag period of tyrosine hydroxylation appreciably, while at concn. between 3.3 and 8.3 mM the lag period was shortened and approached that of the control. At concn. above 10 mM, Tiron shortened the lag period of tyrosine hydroxylation compared with that of the control. Tiron, at relatively high concn. (> 266 mM), inhibited the initial rate of DL-DOPA oxidation by mushroom tyrosinase and lowered the final level of dopachrome formed. Preincubation of mushroom tyrosinase with Tiron resulted in inactivation of the enzyme, with 50% inactivation of 650 ug enzyme occurring in the presence of 400 mM Tiron. AS

Yeasts

- 1015 van Vuuren (HJJ) and van der Meer (L). Fingerprinting of yeasts by protein electrophoresis. *American Journal of Enology and Viticulture* 38(1); 1987; 49-53

Total soluble cell proteins from 27 *Saccharomyces* strains used for commercial production of wine and two strains used for beer fermentations were subjected to polyacrylamide gel electrophoresis. The protein banding patterns were used to 'fingerprint' strains. Different genetic groups of *S. cerevisiae* were distinguished. Protein patterns of strains within each group were closely related or even identical. We confirmed that *Saccharomyces bayanus*, *Saccharomyces uvarum* and *Saccharomyces carlsbergensis* strains are synonyms of *Saccharomyces cerevisiae*. The technique is suitable for characterizing and fingerprinting individual strains of *S. cerevisiae*. It may also contribute to chemotaxonomy of yeasts. AS

Brewer's yeast

- 1016 Nand (K). Debittering of spent brewer's yeast for food purposes. *Nahrung* 31(2); 1987; 127-131 (De).

The analysis of spent brewer's yeast slurry exhibited a five-day biochemical oxygen demand (BOD) of 158400 mg/l at 20% yeast concn. A treatment process for debittering was tried. The steps include removal of extraneous materials, reduction of the viscosity of slurry, debittering the yeast cells and centrifuging, washing and drying the debittered yeast-cell biomass in a drum dryer. Debittering was carried out successfully by adjusting the pH and temp. of the slurry. pH 10 at 50 C of the slurry resulted in the complete debittering of the yeast cells in a single treatment without affecting the chemical and essential amino acid compositions. AS

Saccharomyces cerevisiae

- 1017 Stratford (M), Morgan (P) and Rose (AH). Sulphur dioxide resistance in *Saccharomyces cerevisiae* and *Saccharomyces ludwigii*. *Journal of General Microbiology* 133(8); 1987; 2173-2179

BIOTECHNOLOGY

- 1018 Saha (BC) and Zeikus (JG). Biotechnology of maltose syrup production. *Process Biochemistry* 22(3); 1987; 78-82

Reviews recent development in the process technology of maltose production (liquefaction of starch, saccharification of liquefied starch, production of high maltose syrups, extreme high maltose syrups, high conversion syrups), enzymes for the production of maltose syrups (immobilized enzymes), crystallization of maltose and conversion products from maltose syrups (hydrogenated maltose syrups), production of maltulose, and blending with other sugar syrups. BV

TISSUE CULTURE

Nil

FOOD ADDITIVES

Antimicrobial agents

- 1019 Hughey (VL) and Johnson (EA). Antimicrobial activity of lysozyme against bacteria involved in food spoilage and food-borne disease. *Applied and Environmental Microbiology* 53(9); 1987; 2165-2170

Colorants

Dyes

- 1020 Borzelleca (JF), Capen (CC) and Hallagan (JB). Lifetime toxicity/carcinogenicity study of FD & C Red No. 3 (erythrosine) in rats. *Food and Chemical Toxicology* 25(10); 1987; 723-733

FD & C Red No. 3 was fed to Charles River CD rats as a dietary admixture. In one study the compound was administered to five groups of the F0 generation rats (60 of each sex/group) at levels of 0.0, 0.0, 0.1, 0.5 or 1.0% (original study) and 0.0 or 4.0% (high-dose study). The concurrent control groups received the basal diet. Rats were exposed for a max. of 30 months. No compound-related effects were noted in the in utero phase. Mean body wt. of the female F1 rats on 4.0% FD & C Red No. 3 (3029 mg/ka/body wt. /day) were significantly lower than those of controls ($P < 0.01$) throughout the study. Food

consumption increased in all treated groups in a dose-related manner. There were no significant effects on the haematology, serum chemistry and urinalysis and no compound-related effects on survival. In male rats receiving 4.0% FD & C Red No. 3 (2464 mg/kg/day) thyroid wt. were increased, with a mean wt. of 92 mg compared to 44 mg for controls, and statistically significant increases in the incidence of thyroid follicular cell hypertrophy, hyperplasia and adenomas were recorded. A numerically increased incidence of thyroid follicular adenomas in female rats given 0.5, 1.0 or 4.0% FD & C Red NO. 3 was not statistically significant. The no-observed-adverse-effect levels established in these studies were 0.5% (251 mg/kg/day) for male rats and 1.0% (641 mg/kg/day) for females. KAR

1021 Borzelleca (JF) and Hallagan (JB). Lifetime toxicity/carcinogenicity study of FD & C Red No. 3 (erythrosine) in mice. Food and Chemical Toxicology 25(10); 1987; 735-737.

Charles River CD-1 mice were fed FD & C Red No. 3 in the diet at levels of 0.3, 1.0 and 3.0% in a long-term toxicity/carcinogenicity study. Each group consisted of 60 males and 60 females. Two concurrent control group each of 60 males and 60 females received the basal diet. Max. exposure was 24 months. The no-adverse-effect levels established in this study were 3.0% (an average intake of 4759 mg/kg/day) for male mice and 1.0% (1834 mg/kg/day) for female mice. AS

Emulsifiers

1022 Tokaev (ES), Gurov (AN), Rogov (IA) and Tolstoguzov (VB). Properties of oil/water emulsions stabilized by casein-acid polysaccharide mixtures. Nahrung 31(8); 1987; 825-834 (De).

This paper presents an investigation on the properties of oil/water emulsion stabilized with the soluble casein-acid polysaccharide mixtures. The influence of the properties of the mixture for obtaining thermostable emulsions of hard consistency which could be applied in production of a great variety of foodstuffs and the role of the formation of protein-acid polysaccharide complexes are discussed. BV

Sweeteners

Saccharin

1023 Vidaud (E), Roche (GMO) and Gonzales (E). A new method for the determination of saccharin based on thin-layer chromatography and spectrophotometry. Nahrung 31(2); 1987; 105-108 (De).

Saccharin is extracted from the acidified liquid food with chloroform. This solvent is evaporated; the residue is dissolved in ethyl acetate and applied on a silica gel GF/sub 254/ plate. After chromatographic separation, the saccharin band is scraped off and extracted with 1% sodium carbonate solution. After centrifugation, absorbances at 235 and 244 nm are measured, and the difference $A_{235} - A_{244}$

is obtained. Standards similarly treated permit to get a calibrating plot and calculate the amount of saccharin in the sample. The method has good precision (C.V. 6%) and accuracy (91.2% recovery). AS

CEREALS

- 1024 Hansen (LM), Paukstelis (JV) and Setser (CS). ^{13}C Nuclear magnetic resonance spectroscopic methods for investigating sucrose-starch interactions with increasing temperature. *Cereal Chemistry* 64(6); 1987; 449-451

A methodology to determine the feasibility of investigating starch-sugar interactions using variable temp. ^{13}C -NMR techniques is described. MVG

- 1025 Harinder (K) and Bains (GS). High Alpha-amylase flours: Effect of pH, acid, and salt on paste characteristics. *Cereal Chemistry* 64(6); 1987; 359-363

Falling number and amylograph viscosity results demonstrated the beneficial effect of reduced pH in conjunction with salt on the pastes of high Alpha-amylase flours. A salt concn. of 1.88% distinctly counteracted the detn. effect of increased Alpha-amylase levels of 18, 218 and 540 SKB units/100g of flour. At pH 4.2, the liquefying action of Alpha-amylase was considerably retarded. The peak viscosity of pastes increased considerably as the pH was adjusted to 4.2 with either lactic or hydrochloric acid and a concn. of 1.56% salt in the flour water slumy. AS

- 1026 Lookhart (GL). Gliadins treated with trifluoroacetic acid are water soluble. *Cereal Chemistry* 64(6); 1987; 452

- 1027 Seilmeier (W), Wieser (H) and Belitz (H-D). High-performance liquid chromatography of reduced glutenin: Amino acid composition of fractions and components. *Zeitschrift für Lebensmittel-Untersuchung und -Forschung* 185(6); 1987; 487-489

Reduced glutenin is separated by gel permeation high-performance liquid chromatography into three major and five minor fractions, which significantly differ in their amino acid compositions. By reversed-phase high performance liquid chromatography, about 20 glutenin components are obtained. These can be classified into three groups according to their amino acid compositions; a hydrophilic group with relatively high values of Glx and Phe, a more hydrophobic group with a high content of Gly, and a strongly hydrophobic group with higher values of Val and Leu. Groups 1, 2 and 3 contain middle-high-and low-mol.wt. (MMW-, HMW-, LMW-) subunits resp. AS

Oats

Oat starch

- 1028 Paton (D). Differential scanning calorimetry of oat starch pastes. *Cereal Chemistry* 64(6); 1987; 394-399

Thermal transitions occurring in oat starch were studied by differential scanning calorimetry and the data compared with previously published data on other cereal starches and also to seek a basis for the explanation of anomalies in oat starch paste behaviour. MVG

- 1029 Yiu (SH), Wood (PJ) and Weisz (J). Effects of cooking on starch and Beta-glucan of rolled oats. *Cereal Chemistry* 64(6); 1987; 373-379

Oat meal was prepared by cooking rolled oats, gradually from room temp. or rapidly by adding boiling water, cooked mixture centrifuged and three layer separated and analysed chemically and histochemically. There were distinct difference between the two cooking method. The gradually cooked product had more solubles (1-3)(1-4)-Beta-D-glucan and starch and had a more viscous supernatant. The solids were more hydrated and middle starchy layer occupied a layer volume. There were microscopic differences in the appearance of both cell wall and starch between the two methods. In general, the dispersion of endosperm cellwalls of the gradually cooked sample was greater than that cooked by adding boiling-water; and the middle starchy layer showed a more open structure. All the factors possibly affected the creamier texture of the gradually cooked sample. The possible relationship of these findings was examined as a model by strn using salivary Alpha amylase. Salivary Alpha -amylase digested with the uncooked oats meal more slowly than that cooked oat meal; but small differences observed between gradual-and rapid cooked-cooked samples are probably physiologically significant. MVG

Rice

- 1030 Juliano (BO), Maningat (CC) and Pascual (CG). Properties of fraction of rice hull. *Phytochemistry* 26(12); 1987; 3261-3263

Hulls from waxy(IR29) and non-waxy(IR32) rice had similar compositions. The neutral sugars were mainly glucose and xylose. The major fractions were cellulose and alkali-soluble polysaccharides. Whole hull and its soluble fractions, but not the residue fraction, hardened waxy rice starch gel. Protein was mainly glutelin and was rich in proline. AS

- 1031 Ramarathnam (N), Osawa (T), Namiki (M) and Kawakishi (S). High temperature storage effect on longevity of rice seeds. *Journal of Food Science* 52(3); 1987; 835-836

Storage of Indica (*Oryza sativa* L. cv. Katakutara) and Japonica (*Oryza sativa* L. cv. Kusbue) rice seeds at 30 C and 40 C for 2 months in the dark did not result in the loss of viability in both cv.

Storage at 60 °C, however, resulted in a complete loss of germination after 45 days in the case of Kusbue while the Katakutara rice seeds retained the germination potential well above 95%. Corresponding increases on the linoleic acid content of the free fatty acid fraction and TBA values of the extracted lipid fraction were also observed in Kusbue rice seeds. The investigation indicated that the Indica rice seeds, were better protected than the Japonica rice seeds by the enclosing rice hull during the storage period. AS

Rice flour

- 1032 Brooks (JR) and Griffin (VK). Liquefaction of rice starch from milled rice flour using heat-stable Alpha-amylase. *Journal of Food Science* 52(3); 1987; 712-714

Decreased processing temp. and times were used in conjunction with a commercial heat-stable Alpha-amylase preparation (Termamyl 120L) to liquefy the starch fractions of long and short grain var. of rice. Yields of liquefied starch in excess of 82% dry flour wt. (94% total starch) were obtained using a single-step process and did not require prior heat treatment to gelatinize the starch. Max. reducing sugar concn. for both var. were obtained at 70 °C, while liquefied starch yields were highest at 80-90 °C for the short and long grain, resp. HPLC analyses of the low mol. wt. saccharides (DP 1-10) showed similarities in product profiles between short and long grain samples processed at the same temp. AS

Rye

Rye bran

- 1033 Hromadkova (Z) and Ebringerova (A). Isolation and characterization of hemicelluloses from rye bran. *Nahrung* 31(2); 1987; 149-156 (De).

A procedure for the fractional extraction of rye bran carbohydrates is described and the chemical characterization of the obtained hemicellulose fractions is performed. After the removal of fat and watersoluble carbohydrates, bran was delignified by sodium chlorite and so was obtained the holocellulose (32.9% of native bran). The main part of rye bran hemicelluloses (18.7% of native bran), extracted from the holocellulose by diluted alkali solutions, is of the arabinoxylan type with a small uronic acid content. These hemicellulose are present in a low-branched form with an arabinose/xylose ratio of 0.1-0.3:1 and as highly branched polymers with an arabinose/xylose ratio of 0.5-1:1. A mixture of hemicelluloses (1.1% of native bran) consisting of low-branched arabinoxylan and mannose-rich polysaccharides was extracted by the use of more concn. alkali solutions. The major part of these hemicelluloses remained in the Alpha cellulose fraction of bran. From the fractionation results, the dietary fiber percentage of 35.5% of native bran as well as the wt. ratio for its lignin, cellulose and hemicellulose components of 1:0.3 : 3.7 were calculated. AS

E2S Wheat

8891.VLM.7

- 1034 Dexter (JE) and Tipples (KH). Wheat milling at the Grain Research Laboratory, Milling Feed and Fertiliser 180(7); 1987; 16, 18-20

Milling procedures and equipment used at Grain Research Laboratory are described. Wheat preparation and conditioning routine milling, research mills and pilot mill are the aspects considered. BV

- 1035 Lupano (CE) and Anon (MC). Denaturation of wheat endosperm proteins during drying. Cereal Chemistry 64(6); 1987; 437-442

Wheat seeds (*Triticum aestivum*) of different moisture contents were dried at different temp. and times. Drying decreased the subsequent loaf volume and the solubility of flour proteins. This loss of solubility resulted from sulfhydryl-disulphide interchange reactions. Sodium dodecyl sulphate-polyacrylamide gel electrophoresis performed on flour and dough protein extracts treated or untreated with mercaptoethanol showed a decrease of certain polypeptides as a consequence of drying. This decrease was observed mainly in the glutenin fraction. The results indicate that two types of polypeptides, which differ in mol. wt. and disulphide bonds, were among the protein species most affected by the thermal treatment. The loss of baking quality correlates with the alterations observed in the proteins. AS

- 1036 Rubenthaler (GL) and Pomeranz (Y). Near-infrared reflectance spectra of hard red winter wheats varying widely in protein content and bread making potential. Cereal Chemistry 64(6); 1987; 407-411
- 1037 Sebecic (B). A new possibility of wheat protein content determination. Nahrung 31(8); 1987; 817-823

The possibility of white-grained wheat protein content detn. with LOWRY method directly in sample is investigated. Method is adapted to the substratum and outfit which is used in laboratories for food analyses. Proposed procedure makes it possible to determine protein content in small wt. of sample (cca 20mg). Statistical analysis show that this simple, inexpensive, easily to perform photometric method can be used as a good substitution for Kjeldahl method. AS

- 1038 Williams (PC), Kilborn (RH) Voisey (PW) and Klock (M). Measuring wheat hardness by revolutions per minute reduction. Cereal Chemistry 64(6); 1987; 422-427

Two methods for the adaptation of udy grinder to assess directly the hardness of wheat have been illustrated. MVG

Wheat flour

- 1039 Nowakowski (DM), Sosulski (FW) and Reichert (RD). Air classification of pin-milled break and middling flours from hard red spring wheat. Cereal Chemistry 64(6); 1987; 363-370

Two passes through a commercial pin mill doubled starch damage

and increased the degree of particle size reduction ($< 45 \mu\text{m}$ diam.) to 94% for fifth break flour and to 95% for first middling flour, based on image analysis. Air classification of the twice-milled break flour yielded over 30% of high-protein fraction (28.2% protein, 45.9% starch, 14.0% moisture basis) and 54% of a medium-protein fraction (13.8% protein, 0.40% ash). The twice pin-milled middlings were air classified into 24% of high-(25.0% protein), 22% medium-(12.0% protein), and 54% low-(5.9% protein, 77.4% starch) protein fractions. The two high-protein fractions substituted for gluten at an equal protein basis in bread formulations that contained 15 p.p.m potassium bromate. The medium-protein fraction from air classification of fifth break flour did not adversely affect loaf volumes and bread scores when blended with patent and bakers flour at 9 and 15%, resp. in formulations containing 15 p.p.m potassium bromate. AS

Wheat proteins

- 1040 Clements (RL). A study of gliadins of soft wheat from the eastern United State using a modified polyacrylamide gel electrophoresis procedure. *Cereal Chemistry* 64(6); 1987; 442-448

The paper describes a modified procedure to obtain and compare gliadin patterns in soft wheat cultivars and presents patterns of selected wheat cultivars and classifies cultivars according to similarity in banding patterns. MVG

MILLETS

Corn

- 1041 Augustine (ME) and Baianu (IC). Basic studies of corn proteins for improved solubility and future utilization: A physicochemical approach. *Journal of Food Science* 52(3); 1987; 649-652

Carbon-13 Nuclear Magnetic Resonance (NMR) spectra were recorded for zein corn protein in a number of organic solvent systems to establish the best solvent for these highly hydrophobic proteins. Carbon-13 NMR techniques were used to monitor at the molecular level the mobility of the amino acid side chains in solution. Polyacrylamide gel electrophoresis (PAGE), and sodium dodecyl sulphate polyacrylamide gel electrophoresis (SDS-PAGE) was performed to identify the major subfractions in zein and to determine the effect that solvents such as ethanol and 2-propanol have upon the aggregation of zein proteins. It was determined, based on these studies, that pyridine: water (1:1, v/v) provided the best dispersibility for zein and the best subunit separation. AS

- 1042 Pomeranz (Y) and Czuchajowska (Z). Laboratory tests to predict the commercial yield of flaking or large grits in dry corn milling. *Journal of Food Science* 52(3); 1987; 830, 832

- 1043 Vivas (NE), Waniska (RD) and Rooney (LW). Thin porridges (Atole) prepared from maize and sorghum. *Cereal Chemistry* 64(6); 1987; 390-394
- 1044 Wu (YV), Youngs (VL), Warner (K) and Bookwalter (GN). Evaluation of spaghetti supplemented with corn distillers dried grains. *Cereal Chemistry* 64(6); 1987; 434-436

Cooking qualities and flavour of spaghetti supplemented with corn distillers grains (CDG) fraction of various protein and fiber contents and azeotrope extracted CDG were evaluated. The studies demonstrated that acceptable spaghetti could be prepared with up to 10% CDG, thereby improving its nutritional value while providing additional market for CDG. MVG

Corn proteins

- 1045 Lin (CS) and Zayas (J). Influence of corn germ protein on yield and quality characteristics of comminuted meat products in a model system. *Journal of Food Science* 52(3); 1987; 545-548

This study investigates the influence of corn germ protein as an ingredient and as an emulsion stabilizer for comminuted meat products and detn. of the effect of corn protein on the textural properties, water holding capacity and fat binding capacity of sausage better, yield and quality characteristics of the finished products. BV

Corn starch

- 1046 Krueger (BR), Knutson (CA), Inglett (GE) and Walker (CE). A differential scanning calorimetry study on the effect of annealing on gelatinization behavior of corn starch. *Journal of Food Science* 52(3); 1987; 715-718

Gelatinization characteristics of laboratory-isolated and commercial corn starch were compared by differential scanning calorimetry (DSC) before and after being annealed at subgelatinization temp. in excess water. Prior to annealing, commercial corn starch has a relatively narrow gelatinization range, with a peak temp. at 71°C. Starches isolated in the laboratory have wide gelatinization ranges and lower peak temp. After annealing, commercial starch showed little change in gelatinization characteristics, whereas laboratory starches had narrowed gelatinization ranges, higher peak temp. and increased gelatinization enthalpy, indicating changes in the internal structure of the starch granules. This demonstrates that the wet-milling process anneals corn starch during the isolation procedure. AS

Pearl millets

- 1047 Dhankher (N) and Chauhan (BM). Effect of temperature and fermentation time on phytic acid and polyphenol content of rabadi-A fermented pearl millet food. *Journal of Food Science* 52(3); 1987; 828-829

Rabadi was prepared by fermenting a mixture of pearl millet flour and butter milk for three periods of time (3, 6 and 9 hr) at four

temp. (35, 40, 45 and 50 °C). Temp. had little influence on degradation of either phytic acid or polyphenol content. At all temp. the phytic acid and polyphenol content decreased with an increase in fermentation time. Nine h fermentation resulted in max. reduction of phytic acid (27-30%) as well as total polyphenols (10-12%) at all temp. Phytic acid was reduced to a greater extent than polyphenols. AS

Sorghums

- 1048 Banda-Nyirenda (DBG), Vehra (P) and Ingebreston (KH). Nutritional evaluation of some varieties of sorghums (*Sorghum bicolor* (L) Moench). *Cereal Chemistry* 64(6); 1987; 413-417

Sorghums grown in the 1980 and 1981 seasons were analyzed for dry matter, crude protein, indigestible residue, ether extract, ash, free sugars, starch, tannins, apparent-metabolizable energy, and in vitro crude protein digestibility. Varietal as well as seasonal differences were observed in all the detn. parameters. Tannin values depended upon the method used for their detn. Varietal differences were also found when these samples were incorporated in the diets of flour beetle (*Tribolium castaneum*) larvae to support their growth. Isonitrogenous diets containing sorghums and soybean meal as the main ingredients supported the growth of chicks to different extent depending upon the var. of sorghum. Apparent metabolizable energy and apparent nitrogen retention of these diets for chicks also showed varietal differences. AS

PULSES

Black beans

- 1049 Aguilera (JM) and Ballivian (A). A kinetic interpretation of textural changes in black beans during prolonged storage. *Journal of Food Science* 52(3); 1987; 691-695, 718

Control and roasted (80 °C) dry black beans (*Phaseolus vulgaris*) were stored for 9 months at 8, 10, 12 and/or 14% moisture content and 8.5, 25, and 40 °C. Similarly, beans heated in a solid-to-solid roaster to 51, 61, 72.3, 80, 85.5, 89.5, 101 and 111 °C were maintained at 8% moisture and 25 °C. Final hardness increased with moisture content and temp. Hardening at 8.5 and 25 °C processed initially almost linearly reaching a constant value after 4 to 6 months while at 40 °C it was sigma-shaped. A pseudo-zero order kinetic model fitted for initial rates had an activation energy of 6-11.8 kcal/mol. The hardening rate at 25 °C paralleled the shape of the sorption isotherm. AS

Chickpeas

- 1050 Sotelo (A), Flores (F) and Hernandez (M). Chemical composition and nutritional value of Mexican varieties of chickpea (*Cicer arietinum*

L.). *Qualitas Plantarum - Plant Foods for Human Nutrition* 37(4); 1987; 299-306

Chemical composition and protein quality of the most important chick pea var. cultivated in Mexico were determined. The raw and cooked chickpea analyzed were: Surutato, Surutato 77, Sonora, Sonar 80, Poruquero, Macarena, Breve Duro and a mixture of broken seeds used mainly for animal feeding. The chemical composition of the raw chickpea studied was very similar, the average values of the nutrients were: ash 3.1 plus or minus 0.2, fat 5.0 plus or minus 1.0, protein 10.5 plus or minus 1.2, and fiber 3.7 plus or minus 2.1. Cooking diminished only the ash content and the Porquero variety was the only one that had a high content of crude fiber (9.1%). There was not found agglutinating activity to rabbit RBC in any of the raw chickpeas studied and the trypsin inhibitor activity average was 11.8 plus or minus 2.4 TUI/mg sample. Cooking destroyed 57% of this activity. Digestibility was the same in the raw and in the cooked chickpea (78%). There were not found significant difference in the PER values of the raw and cooked seeds: 1.65-2.30 and 1.80 to 2.61 resp. The Surutato and Breve Duro var. were statistically similar to the casein PER (2.5) It could be recommended to use these two var. mainly for infant feeding. AS

Cowpeas

- 1051 Phillips (RD) and Baker (EA). Protein nutritional quality of traditional and novel cowpea products measured by in vivo and in vitro methods *Journal of Food Science* 52(3); 1987; 696-699

Uncooked meal and meal which had been extruded at various temp. and moistures; slurried, steamed, and drum-dried (SDP); and hydrated to a paste and deep-fat fried (akara) were studied for their nutritional quality. PER values of extrudates (1.81-1.97), and akara (1.89) were higher than those of raw meal (1.44) or steamed, drum-dried paste (1.63). The saturation kinetics model showed similar trends but difference were not significant. In vitro digestibility was highest for extrudates (83-85%) intermediate for akara and SDP (82.8%, 81.2%), and lowest (77.8%) for raw meal. C-PER/DC-PER gave differing and contradictory results. BV

- 1052 Sosulski (FW), Kasirye-Alemu (EN) and Sumner (AK). Microscopic, nutritional and functional properties of cowpea flour and protein concentrates during storage. *Journal of Food Science* 52(3); 1987; 700-706, 736

During storage for 6 months at 64% RH, whole seed flour, dehulled seed flour and air-classified protein conc., from cowpeas showed little change in nutritional or sensory properties but there were improvements in functional properties. However, wet-processed protein conc., after drum-drying, darkened and had reduced functionality by the 6th month. When stored at 79% RH, all cowpea products darkened significantly, showed decreased lysine contents and lower nitrogen solubility. Both dehulling and air classification improved the storage properties of cowpea products but drum drying of a wet-processed

product had an adverse effect on functionality and nutritive value, especially when stored at 79% RH. AS

- 1053 Sosulski (FW), Kasirye-Alemu (EN) and Sumner (AK). Changes in microbiological and lipid characteristics of cowpea flours and protein concentrates during storage. *Journal of Food Science* 52(3); 1987; 707-711, 736

In dry and wet-processed cowpea (WPC) products, the yeast mold and bacterial counts decreased during storage at 64% RH but, by the sixth month at 79% RH, microbial growth rendered the products unsuitable for food use. Significant changes in cowpea lipids were observed in certain products during the 6 month storage period. The drum-dried WPC was stable to lipases and oxidative enzymes at both 64 and 79% RH. The whole seed flour also exhibited a substantial degree of storage stability but microbial growth became excessive at 79 RH by the 4th month of storage. Losses of polyenoic fatty acids were associated with increases in free fatty acids, fat acidity and TBA number during storage of cowpea dehulled seed flour, and air classified cowpeas, at 64% RH. These changes occurred more rapidly at 79% RH and over 70% of the total fatty acid were lost by the 6th month. BV

Faba beans

- 1054 Youssef (I), Abdel Aal (H), Hamza (MA) and El-Banna (AA). Chemical composition of some Egyptian foods made from faba beans (*Vicia faba* L.) *Nahrung* 31(2); 1987; 185-187 (De).

The effects of traditional methods of processing of faba beans in Egypt on their chemical compound including 9 mineral element contents are investigated. BV

Field beans

- 1055 Schmidt (G) and Schmandke (H). On the viscosity behaviour of field bean protein isolates in dependence on their degree of acetylation. *Nahrung* 31(8); 1987; 809-815

The increase of apparent viscosity when protein concn. is raised becomes more and more distinctly pronounced with an increasing degree of acetylation and is displaced at lower protein concn. Investigation of the influence of temp. on viscosity behaviour are therefore carried out on the basis of comparable initial viscosity. 20 min. heat treatment at different temp. shows that above 40 °C the order of magnitude of the temp. induced increase in viscosity depends decisively on the degree of acetylation. With an increasing degree of acetylation there is a comparably stronger increase in viscosity. An increase of viscosity is also linked to increasing duration of the heat treatment. The higher the degree of acetylation, the greater-related to a defined duration of heat treatment - is the growth of viscosity. During the heating phase in cyclical temp. tests a viscosity max is formed at 60 °C which becomes more and more distinctly pronounced with an increasing degree of acetylation. From computerised evaluation of flow curves it is generally established that the complexity of flow properties

increases with increasing degree of acetylation increasing concn. of protein and the effect of heat. AS

- 1056 Winkler (G) and Ludwig (E). About the interaction of tannins from the seedshell of the field bean with protein isolate from field beans and ovalbumin. *Lebensmittelindustrie* 34(4); 1987; 166-170 (De).

The formation of insoluble tannin-protein associates was examined by example of the transformation of condensed tannins from shells of field beans with protein isolate from field beans and ovalbumin. The tannins that were bound by the proteins in form of insoluble aggregations, have been analyzed in indirect or direct way. The binding of the tannin to the proteins with different relations of tannin and protein is dealt with by precipitation curves and adsorption isotherms. AS

Peas

- 1057 Tkachuk (R), Kuzina (FD) and Reichert (RD). Analysis of protein in ground and whole field peas by near-infrared reflectance. *Cereal Chemistry* 64(6); 1987; 418-422

A procedure for selecting near-infrared (NIR) reflectance data that are highly correlated with protein content in field peas was described and these data analysed by a multiple linear regression technique for the purpose of selecting for optimal wave lengths at which protein in peas could be best predicted. MVG

Pigeon peas

- 1058 Nwokolo (E). Nutritional evaluation of pigeon pea meal. *Qualitas Plantarum - Plant Foods for Human Nutrition* 37(4); 1987; 283-290

Presents data on minerals and amino acids composition and availability of fatty acid and metabolizable energy content of pigeon pea by chick assays. Pigeon pea meal contained high amount of P, K, moderate content of Ca and Mg, and low content of Fe, Zn, Cu, and Mn. Average availability of minerals was 58.09%. Amino acid content was low especially cysteine and methionine. Average availability of amino acids was 82.32%. Availability of amino acids in pigeon peas is lower than in soybeans (> 90%). Pigeon pea lipids contained 69.04% of saturated fatty acids and 30.69% of unsaturated fatty acids. Metabolizable energy content was 11.08 MJ/kg in raw pigeon pea and 12.03 MJ/kg in toasted pigeon pea meal. BV

Winged beans

- 1059 King (RD) and Puwastien (P). Respiratory hydrogen following consumption of winged bean seed milk prepared from blanched and soaked seeds and germinated seeds. *Journal of Food Science* 52(3); 1987; 729-731

This study compares the flatulence production in humans after consumption of germinated and ungerminated winged bean milk. Peak breath hydrogen concn. (28 plus or minus 3 p.p.m; mean plus or minus

SEM) was observed between 4.5 h to 6.5 h after consumption of winged bean milk from ungerminated seeds. The peak breath hydrogen concn. was lower ($0.05 > P > 0.01$) at 16 plus or minus 2 p.p.m in volunteers who consumed winged bean milk prepared from germinated seeds where no symptoms of flatulence was reported. BV

OILSEEDS AND NUTS

Cashew nuts

- 1060 Nagaraja (KV). Lipids of high-yielding varieties of cashew (*Anacardium occidentale* L.) *Qualitas Plantarum - Plant Foods for Human Nutrition* 37(4); 1987; 307-311

Cashew kernel lipids from high-yielding var. have been characterised. Neutral lipid accounted for 96% while glycolipid and phospholipid accounted for the remaining 4%. Triglycerides were very rich in unsaturated fatty acid (oleic and linoleic) while glycolipids were rich in saturated fatty acid (lauric and myristic). Varietal difference was noticed with respect to the composition of neutral and glycolipids. Composition of phospholipid did not differ among high-yielding var. AS

- 1061 Polasa (K) and Rukmini (C). Mutagenicity tests of cashewnut shell liquid, rice-bran oil and other vegetable oils using the *Salmonella typhimurium*/microsome system. *Food and Chemical Toxicology* 25(10); 1987; 763-766

In view of the shortage of edible oils in India, nutritional and toxicological evaluation have been carried out on some unconventional oils to determine whether they might be safe for human consumption. As part of these evaluation eight unconventional oils were tested by the Ames mutagenicity assay, using *Salmonella typhimurium* strains TA 98 and TA 100 with and without metabolic activation with S-9 mix prepared from the livers of rats pretreated with sodium phenobarbitone or Aroclor 1254. Of the oils tested, mesta oil (*Hibiscus subdariffa*) and cashew nut shell liquid were mutagenic with and without metabolic activation with S-9 of either source. No mutagenic activity (with or without S-9 of either source) was observed with rice-bran oil, *Cleome viscosa* oil, mango-kernel oil, mahua oil, kapok oil and neem oil. AS

Hazelnuts

- 1062 Villarroel (M), Biolley (E), Schneeberger (R), Ballester (D) and Ramirez (S). Amino acid composition of Chilean hazelnuts. *Food Chemistry* 25(2); 1987; 155-158

Analysis for protein and amino acid contents in selected samples of fully ripened hazelnuts grown wild in Chile showed that protein in deoiled material was 16.3% and eighteen amino acids were found out of which glutamic acid, aspartic acid and arginine were in the greatest concn. Lysine was the limiting amino acid when compared with FAO/WHO

reference pattern with a chemical score of 82. NGKR

Rapeseeds

- 1063 King (RD) and Dieta (HM). Air classification of rapeseed meal. *Cereal Chemistry* 64(6); 1987; 411-413

Air classification of defatted, pulverized rapeseed meal was studied. A protein shift into the fines of between 11.5 and 17.2% was observed. Correlations of the shift of glucosinolates and phytic acid with that of protein ($r=0.99$ and 0.97 , resp.) were significant ($P < 0.1\%$ and $P < 1\%$, resp.) Conc. of protein, glucosinolates, and phytic acid decreased at the lowest cut size ($< 3.5 \mu\text{m}$). AS

- 1064 Lange (R) and Linow (F). About sulphur containing compounds in rape (*Brassica napus*) species and their processing products. Part. 3. *Nahrung* 31(2); 1987; 175-178
- 1065 Lange (R) and Linow (F). About sulphur containing compounds in rape (*Brassica napus*) species and their processing products. Part 4. Preparative isolation of glucosinolates and glucosinolates and glucosinolate mixtures. *Nahrung* 31(8); 1987; 837-841
- 1066 Weigelt (E) and Mieth (G). Production of protein concentration from various rapeseed varieties. Part 2. Extraction of glucosinolates and their splitting products from rapeseeds pure on erucic acid. *Nahrung* 31(2); 1987; 179-182 (De).

Soybeans

- 1067 Ediriweera (N), Akiyama (Y) and Saio (K). Inactivation of lipoxygenase in soybeans with retention of protein solubility. *Journal of Food Science* 52(3); 1987; 685-690

The effects of various processing conditions of soaking, temp, pH and shearing action by homogenization on the inactivation of soybean lipoxygenase while retaining max. protein solubility was investigated. The results showed that lipoxygenase activity was decreased by homogenization and by moderate heating of the three isozymes of lipoxygenase resistance to inactivation by homogenization and heating was in the order of $L1 > L2 > L3$. Total inactivation of soybean lipoxygenase was achieved by soaking the seeds at pH 8.5 at about 50°C for the min. of 3-4 h, followed by homogenizations with water at about 30°C for 15-30 min. at 20,000 r.p.m. BV

Soy flour

- 1068 Tudor (RJ) and Dayan (AD). Comparative subacute effects of dietary raw soy flour on the pancreas of three species, the marmoset, mouse and rat. *Food and Chemical Toxicology* 25(10); 1987; 739-745

Subacute changes induced in the pancreas by raw soy flour have been studied in three species. The raw soy flour was fed to male Sprague-Dawley rats and male CD-1 mice for 2, 4 or 8 days at a level

of 50% (W/W) in the diet, and to male and female marmosets for 2 or 7 days at 20% (W/W) in the diet. The stathmokinetic method was used to study mitotic activity in the pancreas, and mean acinar cell area was calculated using an image analysis system. The relative wt. of the pancreas in the rat and mouse increased during dosing, but that of the marmoset did not. No proliferative or trophic effects were observed in marmoset pancreas, but in both the mouse and rat a transient increase in mitotic activity was followed by a steady increase in acinar cell size. AS

Soy proteins

- 1069 Sathe (SK), Lilley (GG), Mason (AC) and Weaver (CM). High-resolution sodium dodecyl sulphate-polyacrylamide gel electrophoresis of soybean (*Glycine max* L.) seed proteins. *Cereal Chemistry* 64(6); 1987; 380-384

Soybean var.(31 Nos) were evaluated electrophoretically using two high resolution sodium dodecyl sulphate(SDS) and polyacrylamide gel electrophoresis (PAGE). Resolution of soybean-protein subunits comparable to that of urea SDS -PAGE system were approved by increased tris (tris(hydroxy methyl) amino methane concn. in the separating gel (8.25%) linear acrylamide gradient) and the running buffer. Compared to urea SDS-PAGE, non-urea SDS-PAGE permitted the better resolution of the polypeptides in the mol. range of 29, 000 to 32, 000. MVG

- 1070 Shiga (K) and Nakamura (Y). Relation between denaturation and some functional properties of soybean protein. *Journal of Food Science* 52(3); 1987; 681-684, 690

Selected functional properties of soybean protein heat denatured to different degrees were studied. Rheological properties (total breaking energy, Young's modulus) and water-holding capacity of soybean protein gel were improved by the preheat treatment applied during preparation of soybean protein. When soybean proteins were preheated in the presence of N-ethylmaleimide (NEM) or 2-mercaptoethanol (ME), the improvement in rheological properties was largely inhibited. But in the presence of potassium bromate, improvement in rheological properties occurred. The rheological properties and water-holding capacity of gel formed from ground meat containing NEM-treated soybean protein were similar to that of ground meat containing soybean protein preheated without NEM. AS

Sunflower seeds

- 1071 Chapman (GWJr). A proteinaceous competitive inhibitor of lipase isolated from *Helianthus annuus* seeds. *Phytochemistry* 26(12); 1987; 3127-3131

Some of the physical characteristics of sunflower seed inhibitor protein by partial purification and its mode of inhibition by enzyme reaction treties using natural air substrates were studied. MVG

TUBERS AND VEGETABLES

Root vegetables

Carrots

- 1072 Bourne (MC). Effect of blanch temperature on kinetics of thermal softening of carrots and green beans. *Journal of Food Science* 52(3); 1987; 667-668, 690

Turnips

- 1073 Termine (E), Lairon (D), Taupier-Letage (B), Gautier (S), Lafont (R) and Lafont (H). Yield and content in nitrates, minerals and ascorbic acid of leeks and turnips grown under mineral or organic nitrogen fertilizations. *Qualitas Plantarum - Plant Foods for Human Nutrition* 37(4); 1987; 321-332

Tubers

Potatoes

- 1074 Baumgart (J). Presence and growth of *Clostridium botulinum* in vacuum packed raw and cooked potatoes. *Chemie Mikrobiologie Technologie der Lebensmittel* 11(3); 1987; 74-80 (De).

In none of the 120 samples of vacuum-packed potatoes (72 raw, 48 cooked) nor in the 45 samples of untreated spices *Clostridium botulinum* could be found. Identification of the clostridia isolated from these products showed: *Clostridium sporogenes*, *C. perfringens*, *C. bifermentans*, *C. scatologenes*, *C. felsineum*, *C. histolyticum*, and *C. sordellii*. In inoculated pack studies of cooked potatoes (pH 4.8) with acetic acid (0.5%) toxin was detected after 21 days at plus or minus 10 °C. On the other hand, toxin formation in a TPGY-broth was already prevented by acetic acid with a concn. of 0.3% and pH 5.2. In an unpreserved potato-salad on mayonnasie-basis (pH 4.8, acetic acid 0.3%) *Clostridium botulinum* type E was inhibited by the growth of lactobacilli. AS

- 1075 Luna (JA) and Garrote (RL). Prediction of vitamin C retention of potato strips blanched in water. *Journal of Food Science* 52(3); 1987; 634-638, 672

A model based on the mathematics of diffusion was developed to predict the retention of vitamin C of potato strips blanched in water. The vitamin C loss mechanism is by diffusion in unsteady state, considering the losses caused by enzymatic action or thermal degradation to be negligible. The apparent diffusion coeff. of vitamin C in potato is supposed to be constant with the concn., and variable with the temp., according to equation $D_a = D_{a0} \exp(-E_a/R(T - T_0))$, in which D_{a0} and E_a are experimental values different in the 25-65 °C

and 65-100 °C temp. ranges. The model determines a dimensional av. temp. and vitamin C av. concn. as a function of blanching time, at 66, 77 and 88 °C, in straight cut potato strips of 9.5 x 9.5 x 96, 11 x 11 x 96 and 13 x 13 x 96 mm, with heat transfer coeff. infinity 1000 and 300 W/m² °C, resp. The model was verified using published data. AS

- 1076 Mondy (NI), Leja (M) and Gosselin (B). Changes in total phenolic, total glycoalkaloid, and ascorbic acid content of potatoes as a result of bruising. *Journal of Food Science* 52(3); 1987; 631-633

Results of the bruised halves of potato tubes showed higher content of phenols, and total glycoalkaloids (TGA), and lower in ascorbic acid when compared with unbruised controls. Phenol accumulation occurred at 5 °C and the highest TGA at 20 °C storage temp. Storage temp did not affect the ascorbic acid content. Accumulation of total phenols and TGA due to bruising adversely affects potato quality since, in addition to their toxicity these compounds also affect adversely the colour and flavour. BV

Potato chips

- 1077 Coffin (RH), Yada (RY), Parkin (KL), Grodzinski (B) and Stanley (DW). Effect of low temperature storage on sugar concentrations and chip colour of certain processing potato cultivars and selections. *Journal of Food Science* 52(3); 1987; 639-645

Two potato cvs (Kennebec and Simcoe) and one selection (ND 860-2) were stored for 2 months, at 4, 9 and 11 °C. ND 860-2 had the lowest sugar content at all storage temp., produced the lightest coloured chips and was the only sample which gave acceptable cvs (Norchip, Simcoe and Onaway) and one selection (ND 860-2) were evaluated for sugar content and chip colour during growth and harvest, two wk prior and two wk after foliar senescence, and stored under various time-temp. regimes and upon reconditioning. ND 860-2 generally had the lowest levels of fructose, glucose and sucrose and Onaway had the highest. Storage at 5 °C resulted in increase in the three sugars for all tubers, sucrose showing the most notable increase. ND 860-2 was the only sample to consistently produce acceptable coloured chips directly from 5 °C. AS

Sweet potatoes

- 1078 Collins (JL) and Washam-Hutsell (L). Physical, chemical sensory and microbiological attributes of sweet potato leather. *Journal of Food Science* 52(3); 1987; 646-648

A "vegetable leather", a supple, leathery food product, similar to commercial fruit leathers was prepared from baked sweet potato (SP) and other ingredients. The ingredients of the different formulations had no significant effect on composition.

- 1079 Picha (DH). Carbohydrate changes in sweet potatoes during curing and storage. *Journal of the American Society for Horticultural Science* 112(1); 1987; 89-92

The carbohydrate metabolism in 6 sweet potato (*Ipomoea batatas*(L.) Lam) cvs was studied to determine the effect of curing and long-term storage at 15.6 C. 'Travis' contained the highest total sugar concn. and 'Centennial' the lowest among the orange flesh types. Whitestar contained the lowest concn. total sugar among all cvs during storage. Sucrose concn. was greater in the 4 orange-flesh cvs than in the 2 white-flesh cvs during 46 wk of 15.6 C storage. Glucose concn. was slightly greater than fructose, except in 'Centennial'. The mono-saccharides varied with cvs during curing and storage, but generally increased during curing and the first 4 wk of storage. Alcohol insoluble solids decreased during curing and storage in the 4 orange-flesh cvs due to continuous starch degradation. BV

- 1080 Schwartz (SJ), Walter (WMJr), Carroll (DE) and Giesbrecht (FG). Chemical physical and sensory properties of a sweet potato french-fry type product during frozen storage. *Journal of Food Science* 52(3); 1987; 617-619, 633

Few quality changes were observed during frozen storage (0, 3, 6, 9 and 12 months) of a sweet potato french-fry type product, except for an appreciable loss (58%) in vitamin C and apparent increase in carotene (27%). Drying treatment significantly increased the rate of ascorbic acid loss. For the fried product, no appreciable storage-induced changes were noted in the sensory scores for colour, flavour, and texture. BV

Vegetables

- 1081 Pesek (CA) and Warthesen (JJ). Photodegradation of carotenoids in a vegetable juice system. *Journal of Food Science* 52(3); 1987; 744-746

Kinetics of photodegradation of common carotenoids in vegetable juices, were studied and light-induced colour changes were correlated with changes in amounts of specific carotenoids. Degradation reactions fit a first-order kinetic model. The alpha- and beta-carotenes degraded at a much faster rate than lycopene. Colour changes monitored by Gardner colorimeter showed a significant decrease in "yellowness" that correlated with the loss of alpha- and beta-carotene ($r^2 = 0.97$). BV

- 1082 van der Meer (MA), Robbers (JE) and van der Wal (JE). Modifications in Booth's method for the spectrophotometric determination of Beta carotene in vegetables. *Zeitschrift für Lebensmittel-Untersuchung und -Forschung* 185(6); 1987; 461-467

Beta carotenes were determined spectrophotometrically in samples of carrots, leafy vegetables, and brassicas using Booth's method. The modified method yielded lower carotenes in carrots and spinach. The modified method with Beta carotene added to samples the recoveries were 98% -100% and 86-88% for carrots and spinach resp. BV

Cucumber

- 1083 Fleming (HP), McFeeters (RF) and Thompson (RL). Effects of sodium chloride concentration on firmness retention of cucumbers fermented and stored with calcium chloride. *Journal of Food Science* 52(3); 1987; 653-657

This study was carried out to determine the firmness retention in cucumbers brined to ferment at 0 - 5.8% NaCl with 0.2% calcium chloride, with or without increase in salt concn. to 11.9% for the storage period. The effects of uncharacterized softening enzymes, extracted from debris collected at a cucumber grading operation, on firmness retention in the presence and absence of added calcium chloride were also determined. Results indicated that the firmness of brined cucumbers could be retained at appreciably lower NaCl concn. than those traditionally used, but that the lower limit of NaCl required to prevent softening by possible contaminating enzymes is yet to be established. BV

Leafy vegetables

- 1084 Onaymi (O) and Badifu (GIO). Effect of blanching and drying methods on the nutritional and sensory quality of leafy vegetables. *Qualitas Plantarum - Plant Foods for Human Nutrition* 37(4); 1987; 291-298

Results indicated that the steam-blanching and hot air drying of leafy vegetables (*Amaranthus hybridus*, *Celosia argentia*, and *Solanum nudiflorum*) were superior to solar-drying on the basis of nutrient retention (ascorbic acid, carotene and ash) and sensory qualities of colour, texture (crispness) and overall acceptability. The solar dried vegetables had inferior colour, texture and acceptability as compared to the vegetables dried in the cabinet dryer. Addition of sodium bicarbonate and ammonium bicarbonate to the steam-blanch improved the quality and acceptability of the vegetables compared to water-blanch and solar-dried vegetables. There were significant differences in the rehydration and drying ratio of the dried vegetables. The implications of the blanching and drying processes for an effective preservation techniques are discussed. BV

Celery

- 1085 Uhlig (JW), Chang (A) and Jen (JJ). Effect of phthalides on celery flavour. *Journal of Food Science* 52(3); 1987; 658-660

A method for the separation of the phthalide extracted from celery, celeriac and lovage by HPLC and for their identification by GC/MS is described. The relative concn. of 3, n-butyl-phthalide, sedanenolide and sedanolide in 8 var. of celery, 3 var. of celeriac and one var of lovage were determined. Celeriac showed relatively high levels of phthalides while lovage contained predominately butyl phthalide. Sensory evaluation of the samples showed significant correlation with the individual and total phthalides. BV

Tomatatoes

- 1086 Burns (JK) and Pressey (R). Ca^{2+} in cell walls of ripening tomato and peach. *Journal of the American Society for Horticultural Science* 112(5); 1987; 783-787

Ca^{2+} content in cell wall-middle lamella (CW-ML) area of outer and inner pericarp, placenta, and gel parenchyma of ripening tomato (*Lycopersicon esculentum* Mill cvs.) and mesocarp of ripening peach (*Prunus persica* (L) Batsch) was determined by energy dispersive (EDS) X-ray microanalysis. Ca^{2+} increased from 1.50 to 6.95 mg g⁻¹ dry wt. in CW-ML of outer pericarp and 0.98 to 2.60 mg g⁻¹ dry wt. in CW-ML of inner pericarp during ripening. Ca^{2+} content remained constant in tomato placenta and peach mesocarp, and was undetectable in tomato gel parenchyma throughout ripening. CW-ML of peach mesocarp had lower Ca^{2+} content than tomato pericarp and placenta at all ripening stages but total uronic acid content was 2.5 times greater. Pectin methylesterase (PME) activity increased, in tomato pericarp as fruit ripened but remained low and unchanged in placenta and gel parenchyma. PME treatment of pericarp increased amounts of CW-ML Ca^{2+} in the breaker stage but not in the green mature stage. The results indicate that increased amounts of Ca^{2+} are bound to CW-ML of tomato pericarp as ripening occurs but not in placenta or peach mesocarp. Pectin deesterification and wall softening during ripening may in part be factors that control the presence and amount of CW-ML Ca^{2+} . AS

- 1087 Daood (HG), Biacs (PA), Hoschke (A), Harkay-Vinkler (M) and Hajdu (F). Separation and identification of tomato fruit pigments by TLC and HPLC *Acta Alimentaria* 16(4); 1987; 339-350

A HPLC system with a suitable mobile phase for separation of tomato fruit pigments in a sensitive, reproducible, and rapid analytical method causing min changes in the composition of the pigment is described. The new mobile phase can be used for following the biochemical changes occurring in pigment composition during maturation, storage and technological processing of tomato. BV

- 1088 Shewfelt (RL), Prussia (SE), Resurreccion (AVA), Hurst (WC) and Campbell (DT). Quality changes of vine-ripened tomatoes within the postharvest handling system. *Journal of Food Science* 52(3); 1987; 661-664, 672

Quality characteristics of fresh-market tomatoes throughout the postharvest handling system, were monitored to determine the change in colour and firmness at component handling steps. Changes in hue and chroma were observed during simulated warehouse ripening and storage (12.5 °C). Changes in colour and firmness were noted during simulated retail ripening and storage (21 °C). Tomatoes harvested at early stages of maturity maintained firmness longer and remained lighter as the hue changed from pink to red than those harvested at later stages. Shipping of tomatoes at the pink stage or beyond requires modification of handling techniques to slow ripening starting at the packaging house. BV

Tomato juices

- 1089 Gheradi (S), Bazzarini (R), Trifiro (A), Lo Voi (A) and Palamas (D). Preconcentration of tomato juice with reverse osmosis. *Flussiges Obst* 54(8); 1987; 412-414, 418-420

Preconcentration of tomato juice by reverse osmosis in an industrial plant is discussed. After preconcentration the juice may be either concentrated up to 28-30 with existing evaporators or directly packaged as passata (strained crushed tomatoes). The reduction of operating costs and the improvement of product sensory properties linked to the use of reverse osmosis are emphasized. The membranes used showed a very high selectivity towards the components of tomato juice, only some volatile substances of low-mol. wt. are likely to be lost together with the permeate. BV

FRUITS

- 1090 Chandler (LA) and Schwartz (SJ). HPLC separation of cis-trans carotene isomers in fresh and processed fruits and vegetables. *Journal of Food Science* 52(3); 1987; 669-672

Resolution of cis-trans alpha- and beta- carotene isomers was achieved using a rapid (30 min) HPLC method employing a slurry packed calcium hydride column. Results of a survey of fresh and commercially processed fruit and vegetable products indicated that the greatest percentage of isomers was found in processed foods (20.1-54.0%). Cis-isomers were also found in plums, nectarines, and peaches, and no cis-isomers were found in sweet potatoes, carrots and tomatoes. All fresh green vegetables contained 19.6 - 28.3% of mono-cis-isomers. BV

- 1091 Johann (P). Characteristics in processing of tropical fruits. *Flussiges Obst* 54(8); 1987; 430-434, 439-441

- 1092 Watada (AE) and Tran (TT). Vitamins C, B1, and B2 contents of stored fruits and vegetables as determined by high performance liquid chromatography. *Journal of the American Society for Horticultural Science* 112(5); 1987; 794-797

A high performance liquid chromatographic method has been developed for thiamine analysis and to monitor the contents of ascorbic acid, thiamine, and riboflavin of fresh fruits (apples, strawberries) and vegetables (green beans, snap beans, cauliflower, squash, sweet potatoes, potatoes, spinach, and green pepper) stored at different temp. Ascorbic acid content of most fruit and vegetables decreased during storage. Thiamine content of 'Tendergreen' beans and 'BelRus' potatoes decreased during storage; whereas riboflavin of 'Tendergreen' beans decreased during storage and increased in 'superior potatoes'. The changes in other cultivars or commodities were not significant. BV

- 1093 Wendt (E). Detection of toxic heavy metals in products of the fruit and vegetable processing industry. *Lebensmittelindustrie* 34(4); 1987; 161-163 (De).

The selection of analytical techniques, instruments and the capacity for the detection of toxic heavy metals in the fruit and vegetable products is discussed. Spectrophotometric and square-wave polarographic methods of analysis of toxic heavy metals has been tried. BV

Apples

- 1094 Cano (MP), De la Plaza (JL) and Munoz-Delgado (L). Effect of several post-harvest fungicide treatments on carbohydrate evolution of cold stored apples. *Food Chemistry* 25(2); 1987; 135-144

Fungicide treatments were used to preserve "starking" and "Golden Delicious" apples after postharvest during cold storage. The fungicide compounds used in the experiment were Benomyl, carbendazim, imazalil, thiaphanatemethyl and thiabendazole. The fruits were immersed in various concn. of fungicide solutions most important carbohydrates like sucrose, glucose, fructose and sorbitol were estimated in the apples by HPLC. The results of analysis showed that by these treatments carbohydrate content of fruits increased as compared to untreated apples. The apples treated with imazalil showed greater dehydration and more wrinkling of the peel. NGKR

- 1095 Klein (JD). Relationship of harvest date, storage conditions, and fruit characteristics to bruise susceptibility of apple. *Journal of the American Society for Horticultural Science* 112(1); 1987; 113-118

Susceptibility of apples (*Malus domestica* Borkh, 'Gala' and 'Granny Smith') to impact damage increased from early to late harvest time and decreased during storage at 1°C. Impact damage was quantified as bruise depth, diameter, volume or wt. Bruise wt. calculated as a percentage of fruit wt. was the least variable measurement of bruising that was also proportional to height to impact of the fruit. Although a range of 22 New Zealand grown apple cvs. differed in susceptibility to bruising, the variation was not correlated with fruit density, fruit firmness, or polyphenol content and polyphenoloxidase (PPO) activity in epidermal and cortical fruit tissues. AS

- 1096 Lau (OL), Yastremski (R) and Meheriuk (M). Influence of maturity, storage procedure, temperature, and oxygen concentration on quality and disorders of 'McIntosh' apples. *Journal of the American Society for Horticultural Science* 112(1); 1987; 93-99

Studies on effects of storage procedures, storage temp. and fruit maturity on storage quality and development of 'corky' flesh browning in British Columbia-grown 'McIntosh' apples stored in a 1.0% oxygen atm. was investigated. AS

- 1097 Lidster (PD), Loughheed (EC) and McRae (KB). Effects of sequential low-oxygen and standard controlled atmosphere storage regimens on apple

quality. *Journal of the American Society for Horticultural Science* 112(5); 1987; 787-793

Storing 'McIntosh' apples (*Malus domestica* Borkh.) initially in 1.0% or 1.5% carbon dioxide plus 1.0% oxygen at 3 °C (L0) was more effective in retarding firmness loss than initial storage in 4.5% or 5.0% carbon dioxide plus 3.0% oxygen at 3 °C (SCA), indicating that early exposure to L0 suppressed the subsequent rate of softening in SCA. 'McIntosh' firmness retention, determined 1 day after storage and after 7 days at 20 °C, decreased with fruit maturity for all L0 and SCA storage regimens, but mature fruit tended to soften more rapidly in SCA after being exposed initially to L0. Initial storage in SCA for > 75 days with subsequent storage in L0 (in 1984) did not result in firmer apples than those stored continuously in SCA. The initial exposure period in L0 needed to induce retention of apple firmness depended on cultivar and temp. For 'McIntosh' 'Spartan' and 'Golden Delicious' cultivars, resp, max. poststorage fruit firmness was reached after 7.5, 4.5 and 1.5 months of initial exposure to L0 at 0 °C and after 4.5, 3.0, and 3.0 months at 3 °C. Poststorage evolution of carbon dioxide and C₂H₄ and the severity of senescent disorders generally decreased with continuing storage in L0, but the incidence of low-oxygen injury increased. Poststorage ethanol evolution increased with exposure to 1.0% oxygen in 'McIntosh' apples stored at 0 °C and 'Spartan' apples held at either 0 or 3 °C. Chemical name used: butanedioic acid mono(2,2-dimethyl hydrazide) (daminozide). AS

Bananas

- 1098 Adisa (VA) and Okey (EN). Carbohydrate and protein composition of banana pulp and peel as influenced by ripening and mold contamination. *Food Chemistry* 25(2); 1987; 85-91

This investigation describes the effects of fire wood burnt ash and a fruit mold *Botryodiplodia theobromae* on the total proteins and some carbohydrate constituents of the banana fruit during ripening. It was found that there was no appreciable effect on the proximate composition of the fruit except for a slight decrease in the moisture content of the peel. The effect of the mold *B. theobromae* on the food constituents shows a general decrease or some loss of glucose and fructose and drastic reduction of total sugars where as cellulose remained fairly constant during ripening with reduction in starch content. Low levels of proteins have been reported both in the peel and pulp. The addition of ash was found to hasten ripening when compared with the naturally ripened peel. NGKR

Berry

Vaccinium uliginosum

- 1099 Andersen (OM). Anthocyanins in fruits of *Vaccinium uliginosum* L. (Bog whortleberry). *Journal of Food Science* 52(3); 1987; 665-666, 680

Blackberries

- 1100 Sapers (GM), Burgher (AM), Jones (SB) and Phillips (JG). Factors affecting drip loss from thawing thornless blackberries. *Journal of the American Society for Horticultural Science* 112(1); 1987; 104-109

Fruits from thornless blackberry (*Rubus* sp.) cvs. were compared to determine causes of variation in drip losses during thawing after frozen storage. Drip was similar in composition to juice obtained by pressing. Drip losses for different cv. ranged between 1% and 30% in 1984; increased losses in 1983 were attributed to poor fruit condition. Drip losses were greater in riper samples but did not depend on fruit size. Drip losses were correlated with low insoluble pectin. Microscopic examination revealed an inverse relationship between the tendency to drip and the epidermal cell layer thickness. AS

Cranberries

- 1101 Sapers (GM) and Hargrave (DL). Proportions of individual anthocyanins in fruits of cranberry cultivars. *Journal of the American Society for Horticultural Science* 112(1); 1987; 100-104

Variation in the proportions of individual anthocyanins in cranberry (*Vaccinium macrocarpon* Ait.) fruit of different colouration was investigated. Light-medium-, and dark-red subsamples of 'Franklin', 'McFarlin', and 'Searles' cranberries were analysed to determine the soluble solids: acidity ratio (SS:A), total anthocyanin, and individual anthocyanins. Qualitative and quantitative differences in the pattern of individual anthocyanins among clones studied over three seasons were not significant. Proportions of individual anthocyanins in fruit subsamples of different colouration within cv. samples also were similar, indicating constant biosynthetic rates for each anthocyanin during colour development. Linear relationship between HPLC peak areas for individual anthocyanins and subsamples total anthocyanin or SS:A values were observed. AS

Grapes

- 1102 Hsu (J-C) and Heatherbell (DA). Isolation and characterization of soluble proteins in grapes, grape juice, and wine. *American Journal of Enology and Viticulture* 38(1); 1987; 6-10

The present study reports the application of improved sensitive techniques for the detn. of proteins in grape juices and wines which minimise interference from phenolics and oxidase enzymes during extraction of proteins in juice and wine samples by electrophoretic techniques. It also permits the detection of glycoprotein and permits the simultaneous detn. protein mol. wt. and isoelectric point by two dimensional isoelectric focussing lithium dodecyl sulphate polyacrylamide gel electrophoresis. MVG

- 1103 Molina (I), Salles (C), Nicolas (M) and Crouzet (J). Grape alcohol dehydrogenase. II. Kinetic studies: Mechanism, substrate, and coen-

zyme specificity. *American Journal of Enology and Viticulture* 38(1); 1987; 60-64

Kinetic study was conducted of the reaction catalysed by the grape alcohol dehydrogenase isolated previously in order to elucidate the mechanism involved and obtain information on substrate and coenzyme specificities of this enzyme with particular emphasis on six-carbon aldehydes produced during the action of lipoxygenase and cleavage enzymes on polyunsaturated fatty acids, and hydroperoxides, resp. The studies suggest that grape alcohol dehydrogenase possess a single catalytic site which accepts NADH or NADPH, the catalytic efficiency being more important in the presence of NADH. No NADP + linked activity was detected with purified enzyme. MVG

- 1104 Parish (ME) and Carroll (DE). Fermentation characteristics of *Saccharomyces cerevisiae* isolates from *Vitis rotundifolia* grapes and musts. *American Journal of Enology and Viticulture* 38(1); 1987; 45-48

This study was conducted to determine if the *Saccharomyces cerevisiae* isolates recovered from *Vitis rotundifolia* musts possessed desirable wine yeast characteristics. MVG

- 1105 Strauss (CR), Wilson (B), Anderson (R) and Williams (PJ). Development of precursors of C13 nor-isoprenoid flavourants in Riesling grapes. *American Journal of Enology and Viticulture* 38(1); 1987; 23-27

Concn. of vitis pirane 1:1.6-trimethyl 1.2 dihydronaphthalene (TDN) and damascenone were determined in heated Riesling grape juices expressed from fruit harvested over a range of maturities. There was a positive relationship between the concn. of the heat induced volatiles and Brix values which suggested that precursors of the nor-isoprenoids develop in the fruit along with sugar translocation. Given the importance of TDN particular to bottle-aged character, this study implicates grape maturity as a contributing factor in the ultimate bottle aging of Riesling wines. AS

Mangoes

- 1106 Hemavathy (J), Prabhakar (JV) and Sen (DP). Composition of polar lipids of Alphonso mango (*Mangifera indica*) kernel. *Journal of Food Science* 52(3); 1987; 833-834

Total kernel lipids, (TL) in Alphonso mango (*Mangifera indica*) extracted amounted to 11.6% of the dry kernel. The TL consisted of 96.1% neutral and 3.9% polar lipids which comprised 2.9% glycolipids and 1.0% phospholipids. At least six glycolipids and six phospholipids were identified. Acyl-monogalactosyldiacylglycerol, monogalactosyldiacylglycerol, and digalactosylmonoacylglycerol were the major glycolipids, while acylated stearyl glycoside, monogalactosylmonoacylglycerol and digalactosyldiacylglycerol were present in small quantities. The phospholipids consisted of phosphatidic acid, phosphatidylcholine and phosphatidylinositol as major phospholipids and minor amounts of phosphatidylglycerol, phosphatidylethanolamine and lysophosphatidylethanolamine. The fatty acid

composition of these different glycolipids and phospholipids was determined. AS

Strawberries

- 1107 Costell (E), Carbonell (E) and Duran (L). Chemical composition and rheological behaviour of strawberry jams. Relation with fruit content. *Acta Alimentaria* 16(4); 1987; 319-330

Relationships between fruit content in jams and both certain fruit components and some rheological parameters of the broken down gels were studied. Fifteen experimental strawberry jam samples were analyzed. Fruit content ranged from 28 to 61%. Correlation coeff. between fruit content and two chemical indices (Mg and N) and between fruit content and two rheological indices; yield stress ($\tau_{0.1}$) and relation between two apparent viscosity values ($\eta_{a,1}$ / $\eta_{a,2}$), selected by multiple stepwise linear regression, were similar ($r = 0.894$ and 0.841 , resp.) and significant at $P = 0.01\%$. Correlation coeff. between fruit content and both chemical and rheological indices (Mg, N, $\tau_{0.1}$, flow index and consistency index) was higher ($r = 0.947$). These results show that the joint consideration of the variability of two chemical and three rheological indices may explain $\sim 90\%$ ($r^2 = 0.897$) of the variability in fruit content, which is clearly higher than the proportions explained by chemical indices (80%) or rheological indices (70%) separately. AS

CONFECTIONERY, STARCH AND SUGAR

Confectionery

Chocolates

- 1108 Tonella (ML-F) and Beery (JW). Characteristics of a chocolate beverage from germinated chickpeas. *Journal of Food Science* 52(3); 1987; 726-728

A chocolate flavoured beverage developed from germinated chickpeas (*Cicer arietinum*) showed reduced viscosity and improved consistency when compared with a control formulated from ungerminated chickpeas. The acceptability of beverage was established by sensory evaluation. A paired preference test indicated no significant difference between germinated chickpea beverage and a commercial chocolate milk. BV

Starch

- 1109 Bhattacharya (M) and Hanna (MA). Kinetics of starch gelatinization during extrusion cooking. *Journal of Food Science* 52(3); 1987; 764-766
- 1110 Knuckles (BE) and Betschart (AA). Effect of phytate and other myo-inositol phosphate esters on Alpha-amylase digestion of starch. *Journal of Food Science* 52(3); 1987; 719-721

The effects of phytate and other myo-inositol phosphate esters (containing one or more phosphate groups) on Alpha-amylase digestion of soluble potato starch were evaluated by an *in vitro* procedure. Human salivary or *Bacillus subtilis* Alpha-amylase was treated with either 2mM or 5mM phytate, myo-inositol-2-monophosphate (1-2-MP), or phytate hydrolyzed to various degrees, and then incubated at 37 °C with the starch at pH 4.15 or 6.90. Starch digestion varied with degree of phosphorylation of inositol, inositol phosphate ester concn., pH and enzyme source. At pH 4.15, phytate (2mM) and 1-2-MP (2mM) reduced starch digestion by salivary Alpha-amylase to 8.5 and 78.3%, resp., of the control. AS

Sugar

- 1111 Arwidsson (JO) and Tragardh (C). Mechanical dewatering of sugar-beet pulp: Process characteristics and mathematical modelling. *Acta Alimentaria* 16(4); 1987; 305-315

The mechanical dewatering of sugar-beet pulp can be described as two simultaneous processes; compaction of a solid matrix and permeation of the enclosed liquid. Both these processes depend on the chemico-physical properties of the pulp. Apart from the biological characteristics of the beets these properties are, to a large extent, influenced by the conditions in the sugar extraction process preceding the dewatering and any additives that may be used. The influence of extraction pH, extraction temp. and added calcium ions on the dewatering results is reported here. Positive results were obtained with a decreased pH, decreased temp. and the addition of calcium ions. A semi-empirical mathematical model describing the dewatering process is also presented and evaluated with respect to pulp characteristics. It is demonstrated also how the model could be used in the design and optimization of the process. AS

Molasses

- 1112 Dumoulin (ED), Azais (BP) and Guerain (JT). Determination of sugar and ethanol content in aqueous product of molasses distilleries by near infrared spectrophotometry. *Journal of Food Science* 52(3); 1987; 626-630

The use of near infrared spectrophotometry to determine rapidly sugar content in aqueous beet molasses and the ethyl alcohol content in fermented molasses is studied. The effect of varying amounts of dry matter in the fermentation mixtures on the efficacy of the method is also studied. The results indicate that NIR spectrophotometry can be used successfully for rapid (1 min) and routine detn. of quality control of distillery products such as sugared juices, beet or grape wines or products of cereal distilleries. The relative content in sugar and non-sugar in the molasses is an important factor for sugar detn. but the non-sugar content has no effect on the ethanol detn. BV

Sugars

Sucrose

- 1113 Richardson (SJ), Baianu (IC) and Steinberg (MP). Mobility of water in sucrose solutions determined by deuterium and oxygen -17 nuclear magnetic resonance measurements. *Journal of Food Science* 52(3); 1987; 806, 809, 812

BAKERY PRODUCTS

Cookies

- 1114 Krishnaprasad (A) and Sandhu (JS). Effect of cereal and tuber starches on the cookies quality. *Chemie Mikrobiologie Technologie der Lebensmittel* 11(3); 1987; 89-94

The suitability of wheat, corn and tapioca root starches as diluent for improving the quality of cookies made from medium hard wheat flour, is reported in this paper. The bread wheat starch even at 10% level, gave dough that was relatively easy to handle as compared to other starches. The baking time was also higher for cookies containing corn and tapioca starches. The peak force (kg m/s²) for 30% compression (Instron Texturometer) in case of cookies made with bread wheat starch was nearer to the values for the control flour. As far as the suitability and efficiency of different starches as diluent for the medium hard wheat flour for improving the cookies quality is concerned, the bread wheat starch give the best performance. Cookies with excellent sensory quality and consumer acceptability were produced by using appropriate levels of bread wheat starch as a diluent to adjust the protein level of wheat flour. AS

Crackers

- 1115 Rogers (DE) and Hosney (RC). Test to determine the optimum water absorption for saltine cracker doughs. *Cereal Chemistry* 64(6); 1987; 370-372

Dough

- 1116 Grant (DR). Ascorbate oxidase inhibition in dough by fluoride ion and its effect upon dough rheology. *Cereal Chemistry* 64(6); 1987; 403-406
- 1117 Okada (K), Negishi (Y) and Nagao (S). Factors affecting dough breakdown during overmixing. *Cereal Chemistry* 64(6); 1987; 428-434

Tortillas

- 1118 Vivas (ME), Waniska (RD) and Rooney (LW). Effect of tortilla production on proteins in sorghum and maize. *Cereal Chemistry* 64(6); 1987; 384-389

MILK AND DAIRY PRODUCTS

- 1119 Fuhrmann (J). About the application of the reflection spectroscopy in the near infra-red range in dairy. I. *Lebensmittelindustrie* 34(4); 1987; 171-174 (De).

The measuring process, the mathematical evaluation of the examinations and questions of the calibration of NIR spectroscopic instrument are dealt in this survey. The possibilities and limitations of NIR spectroscopic application for the non-destructive analysis of dairy products are discussed. BV

Milk

- 1120 Anap (GR), Agrawala (SP) and Patil (GR). Studies on UHT processing of buffalo milk. Part-I. Sterilizing effect. *Indian Journal of Dairy Science* 40(2); 1987; 273-277

The most heat resistant mesophilic spore (*B. subtilis*) and thermophilic spore (*B. stearothermophilus*) were used in the study to investigate the sterilizing effect of UHT plant at 130, 135, 140 and 145 °C processing temp. at four holding times viz. 3.28, 9.57, 16.21 and 22.73 min. Very high sterilizing effects were achieved for thermal inactivation of *B. subtilis* and *B. stearothermophilus* spores. At same processing conditions, more sterilizing effect was achieved with *B. subtilis* than *B. stearothermophilus*. The sterilizing effects obtained in this study, however, were enough to constitute satisfactory commercial sterility. AS

- 1121 Gaya Pradsad, Kulshrestha (DC) and Khan (BL). Effect of different heat treatments on nutritive value of buffalo milk. *Indian Journal of Dairy Science* 40(2); 1987; 322-323

- 1122 Rajarathinam (R), Shankar (PA) and Laxminarayana (H). Growth and activity of aerobic spore-forming bacteria in boiled milk. *Indian Journal of Dairy Science* 40(2); 1987; 268-272

In boiled milk held at 30 °C for upto 24 h the spore count decreased from 480/ml initially to 45/ml, after 12 h total count increased from 470/ml to 1.6×10^6 per ml, pH decreased from 6.55 to 5.5, titratable acidity increased from 0.15% to 0.52%, tyrosine value increased from 0.72 mg to 0.132 mg and free fatty acids content increased from 0.66 to 0.78 ml. Added spores (420/ml) of *B. cereus* grew rapidly in boiled milk reaching a total count of 1.16×10^6 ml at 24 h, turned milk positive for COB test at 16 h and curdled milk at 24 h. In the case of *B. megaterium*, (340/ml) the milk became positive for COB test after 24 h and total count increased to 10.5×10^6 ml. The keeping quality of once boiled milk was enhanced on second boiling and the twice boiled milk remained negative for COB test even after a storage period of 14.5 h at 37 °C, 21.5 h at 30 °C and 28.4 h at 37 °C. AS

- 1123 Rama Raju (VV) and Nambudripad (VKN). Growth characteristics of heat injured *E. coli* B in different media. *Indian Journal of Dairy Science* 40(2); 1987; 225-228

The growth pattern of normal cells and sublethally heat injured cells of *E. coli* B₂₃ were studied in nutrient broth, skim milk and minimal broth when enumerated on nutrient agar. With increased heat stress and duration of time the cells of the organisms experienced sublethal injury. As such the physical and physiological status of the cell is altered resulting in prolonged lag phase and non-logarithmic growth pattern due to heterogeneity of injured cell population as is evidenced by variations in MGT, when compared to shorter lag and logarithmic growth of normal cells. AS

- 1124 Reichardt (W) and Schuler (E). The quantitative estimation of the protein content in milk by means of ultraviolet spectral photometry. Part 3. Experiments on the estimation of the protein content in unskimmed milk. *Nahrung* 31(8); 1987; 793-799

- 1125 Reichardt (W), Schuler (E), Sieber (L) and Schuler (E). The quantitative estimation of the protein content in milk by means of ultraviolet spectral photometry. Part 4. The estimation of protein from preserved milk samples. *Nahrung* 31(8); 1987; 801-807 (De).

- 1126 Surendra Nath (B) and Rama Murthy (MK). Effect of copper and tocopherol on the rates of formation and breakdown of peroxides in milk fats of buffalo and cow. *Indian Journal of Dairy Science* 40(2); 1987; 292-295

Buffalo milk

- 1127 Anap (GP), Agrawala (SP) and Patil (GR). Studies on UHT processing of buffalo milk. Part II. Death kinetics of heat resistant spores. *Indian Journal of Dairy Science* 40(2); 1987; 278-281

The thermal death kinetics was studied at ultra-high temp. The D values varied from 0.8 to 18 sec. for thermal destruction of *B. stearothermophilus* between 145 and 130 °C temp. range. The Z-value was constant (Z = 10.5 °C) during complete temp. range. The activation energy (Ea) was high for thermal destruction of *B. stearothermophilus* (i.e. 68.229 Kcal/mole). The activation enthalpy (Delta H*) and activation entropy (Delta S*) values for thermal destruction of *B. stearothermophilus* were 67.5 kcal/mol. and 104 cal/mol. C resp. AS

Goats milk

- 1128 Khatoon (JA) and Joshi (VK). Effect of different heat treatments on proteose-peptone and non protein nitrogen contents of goat milk. *Indian Journal of Dairy Science* 40(2); 1987; 243-245

Pasteurization of goat milk samples did not exhibit any changes in the proteose-peptone (PP) content. Milk on boiling gave an increase in its PP level. A drop in PP level was also observed fol-

lowing the increase on first boiling. Both goat and cow milk behaved in a similar manner. Sterilization of milk (at 115 °C for 10 min and 120 °C for 20 min) was observed to decrease its PP content. Increase in sterilization temp. caused a gradual decrease in PP level in milk, but in both the cases NPN was observed to be increased gradually with the increase in temp. and time. Both goat and cow milk behaved in a similar manner. AS

Milk products

- 1129 Abdel Baky (AA), Neshawy (AA), Rabie (AM) and Salem (O). Improving the quality of some Egyptian fermented dairy products made from dried milk. *Nahrung* 31(2); 1987; 109-116 (De).

A trial has been made to improve the quality of Zabadi and Kariesh cheese made from dried milk using whey protein conc. Fortification of recombined milk used for Zabadi making or reconstituted milk for Kariesh cheese manufacture with whey protein conc. at levels of 2.5, 5.0, 7.5 and 10.0% enhanced the organoleptic and compositional qualities of both products. This treatment reduced wheying off and stimulated the formation of acetaldehyde and total volatile acidity and bacterial growth during storage of Zabadi at refrigeration temp. for one wk. AS

- 1130 Shah (RK), Prajapati (JB) and Dave (JM). Packaging materials to store a spray-dried acidophilus malt preparation. *Indian Journal of Dairy Science* 40(2); 1987; 287-291

Spray-dried acidophilus malt preparation was packed in pouches of (i) polyethylene aluminium foil laminate, (ii) polyethylene and (iii) metallised poly-paper. During ambient storage of two months the moisture content increased and the *Lactobacillus* counts decreased at different rates depending on the types of packaging material. The final per cent moisture was 3.12, 3.61 and 6.59 and the per cent survivors were 9.13, 4.39 and 2.14 for the packaging materials (i), (ii) and (iii) resp. Polyethylene-aluminium foil laminated pouches could be suggested as one of the suitable packaging materials for dried products containing live *Lactobacillus* cells. Polyethylene pouches were ranked second and the cheapest among the three. AS

Butter

- 1131 Satish Kulkarni and Rama murthy (MK). Relation between properties of fat and rheological characteristics of butter. *Indian Journal of Dairy Science* 40(2); 1987; 232-237

The fatty acid composition, iodine value (IV), high melting triglycerides and trisaturated glyceride contents influenced the various rheological properties of butter and butter spreads. Increase in IV and decrease in high melting and trisaturated glycerides gave soften butter and butter spreads. BV

Cheese

- 1132 Omar (MM) and El-Zayat (AI). A study on the ripening of white pickled Brinza cheese made from ewe's milk. *Nahrung* 31(8); 1987; 783-791 (De).

The chemical composition, the microbiological feature and the microstructure of young and mature Brinza cheese were investigated. During ripening fat, total N, soluble N, non protein N; peptide N, amino acid N and acidity increased while the microbial feature decreased. The amount of free amino acid and free fatty acid increased with storage and the patterns of their distribution changed with the highest levels for lysine, glutamic, oleic, palmitic and myristic acids. The microstructure of fresh Brinza cheese consists of micelles joined together to form an open network with clustering of micelles. During ripening, these micelles continued to aggregate and coalesce with increasing fusion process to give more homogeneous and loose structure similar to that in white pickled Domiati cheese. AS

Cabrales cheese

- 1133 Alonso (L), Juarez (M), Ramos (M) and Martin-Alvarez (PJ). Overall composition, nitrogen fractions and fat characteristics of Cabrales cheese during ripening. *Zeitschrift fur Lebensmittel-Untersuchung und -Forschung* 185(6); 1987; 481-486

Cheddar cheese

- 1134 Lin (JCC), Jeon (IJ), Roberts (HA) and Milliken (GA). Effects of commercial food grade enzymes on proteolysis and textural changes in granular cheddar cheese. *Journal of Food Science* 52(3); 1987; 620-625

Addition of a neutral protease, a combination of lipase and protease, and a culture/enzyme mixture to granular cheese curds increased proteolysis significantly. However, the culture/enzyme mixture produced total free amino acids faster than the other enzymes with gross proteolysis similar to that of controls. Non-linear correlations existed between the total free amino acid production and gross proteolysis. Statistical analysis, however, indicated that gross proteolysis is more reflective to the cheese texture development in the enzyme-added cheese than total free amino acid content. A statistical model was developed to predict the total amino acid production in the enzyme-treated cheese. BV

- 1135 Sukumaran (MV), Natarajan (AM) and Ranganathan (B). Effect of some additives on acceleration in the ripening of Cheddar cheese. *Indian Journal of Dairy Science* 40(2); 1987; 296-302

Studies were carried out to evaluate the effect of different modifications introduced during the manufacture of Cheddar cheese on acceleration in the ripening process. Among the additives papain digested milk and casamino acids with manganese ions contributed to acceleration in the ripening process as these experimental lots of cheese secured higher grades on sensory evaluation compared to control

and other experimental cheese lots. AS

Curd

- 1136 Nolan (EJ). Stress relaxation of stored stirred Cheddar curd. *Journal of Texture Studies* 18(3); 1987; 273-280

Dahi

- 1137 Jayaram (P) and Gandhi (DN). Role of market dahi as an inoculum for rapid preparation of Dahi. *Indian Journal of Dairy Science* 40(2); 1987; 374-376

Ghee

- 1138 Ramesh (B) and Bindal (MP). Softening point, melting point and fatty acid composition of solid and liquid fractions of cow, buffalo and goat ghee. *Indian Journal of Dairy Science* 40(2); 1987; 303-308
- 1139 Sharma (D) and Bindal (MP). GLC analysis of free fatty acids of cow and buffalo ghee without their prior isolation. *Indian Journal of Dairy Science* 40(2); 1987; 238-242
- 1140 Yadav (JB) and Srinivasan (RA). Role of starter culture in enhancing ghee flavour. *Indian Journal of Dairy Science* 40(2); 1987; 153-157

Reviews flavour compounds of ghee responsible for its flavour, mechanism of flavour enhancement in ghee by starter culture, and simulation of ghee flavour. 28 references. BV

Khoa

- 1141 More (GR). Development of semi-mechanized khoa making equipment. *Indian Journal of Dairy Science* 40(2); 1987; 246-248

A hygienic khoa-making equipment is described. Operating condition of the equipment for dehydration of milk is to keep (i) heating temp. at 121 °C and (ii) speed of the scraper at around 28 r.p.m. The average % yield of khoa is 15.8 at 22.3% moisture content and electrical energy consumed per kg of milk handled is 0.093 KWH. The equipment works satisfactorily for better-quality khoa production at small and medium scale. BV

MEAT AND POULTRY

- 1142 Knupp (G), Bugl-Kreickmann (G), Commichau (C), Schmidt (T) and Buning-Pfaue (H). The determination of the coccidiostat nicarbazin in animal tissues and eggs. I. Determination by means of pulse polarography and HPLC with electrochemical detection. *Zeitschrift für Lebensmittel-Untersuchung und -Forschung* 185(6); 1987; 472-476

- 1143 Sitzmann (W) and Munch (E-W). Processing of animal raw materials. **FAT Science and Technology** 89(9); 1987; 368-374 (De).

In the commercial production of fish and meat products which are intended for human consumption, waste products are obtained which can be used, e.g., in the feeds industry, for the production of glue and gelatine or in the chemical industry. Generally, during further processing of these waste materials, following a cell opening stage, they are separated into high-protein solids and the fat/oil and water phases. As an ecologically and economically advantageous alternative to the conventional methods in which the cells are generally opened by thermal treatment, as new method-the ELCRACK, process, has been developed. The ELCRACK-process is a combination of the product-saving opening of animal cells under the influence of a high-voltage electrical field at comparatively low temp. and the subsequent mechanical solid-liquid separation which takes place in a screw press and the centrifuges. Taking bone processing as an example, this process is explained more in detail and compared with conventional methods. AS

Meat

- 1144 Doyle (MP) and Schoeni (JL). Isolation of *Escherichia coli* 0157: H7 from retail fresh meats and poultry. **Applied and Environmental Microbiology** 53(10); 1987; 2394-2396
- 1145 Foegeding (EA) and Ramsey (SR). Rheological and water-holding properties of gelled meat batters containing iota-carrageenan, kappa-carrageenan or xanthan gum. **Journal of Food Science** 52(3); 1987; 549-553

Meat batters containing either 0.5% or 1% iota-carrageenan (IC), kappa-carrageenan (KC), or xanthan gum (XG) were investigated. Rigidity changes during heating and Instron texture profile analysis indicated textural properties of batters. All treatments exhibited a decrease in water-holding ability (WHA) from 55-70 C. Addition of IC increased WHA, rigidity at 70 C, force-to-fracture and true shear strain. KC increased rigidity at 70 C and was most effective at increasing hardness, XG decreased all textural parameters measured. Gums were specific in affecting textural and WHA properties. AS

- 1146 Thannoun (AM), Mahoney (AW), Hendricks (DG) and Zhang (D). Effect of meat-bread mixtures on bioavailability of total dietary iron for anemic rats. **Cereal Chemistry** 64(6); 1987; 399-403

The objectives of the study was to determine if meat enhances the bioavailability of total dietary iron in meat/bread mixtures incorporated into diets fed to anemic rats. Both whole wheat bread and enriched white bread were studied. To determine the amounts of iron levels that were max. available, diets were formulated with iron levels which did not exceed iron requirements. MVG

- 1147 Tomas (MC) and Funes (J). Application of 2-thiobarbituric acid reaction to exudates of frozen and refrigerated meats. **Journal of Food Science** 52(3); 1987; 575-579

Results of the study shows that the lipid oxidation in frozen and refrigerated meats could be followed by determining the 2-thiobarbituric acid reactive substance (TBARS) content in the exudates of such meats, eliminating the heating step of the distillation method. BV

Beef

- 1148 Bodwell (CE), Miles (CW), Morris (E), Prather (ES), Mertz (W) and Canary (JJ). Long-term consumption of beef extended with soy protein by men, women and children: II. Effects on iron status. *Qualitas Plantarum - Plant Foods for Human Nutrition* 37(4); 1987; 361-376

This study reports the effects of consuming beef extended with soy protein on Fe and Zn status of children, women, and men and the effects of iron and zinc fortification on possible alterations in Fe and Zn status resulting from consumption of beef extended with soy protein. Results indicated that the consumption of beef extended with soy protein had no deleterious effect on iron status of men, women, or children. BV

- 1149 Bowers (JA), Craig (JA), Kropf (DH) and Tucker (TJ). Flavour, colour, and other characteristics of beef longissimus muscle heated to seven internal temperatures between 55 and 85 °C. *Journal of Food Science* 52(3); 1987; 533-536

Beef longissimus muscle steaks with increased internal temp. (55-80 °C) during broiling or roasting showed an increase in mouth-filling blend and browned flavour, but bloody-serumy, metallic, and sour flavours and juiciness decreased. Cooking loss increased gradually with increased internal temp. (75 and 80 °C). The loss probably resulted from protein denaturation at temp. between 75 °C and 80 °C. Visual colour change occurred between 55 °C and 80 °C. Beef flavour components and juiciness occurred from 55 °C to 65 °C. BV

- 1150 Ghavimi (B), Althen (TG) and Rogers (RW). Effects of tumbling at various speeds on some characteristics of restructured cured beef. *Journal of Food Science* 52(3); 1987; 543-544, 553

The effects of different tumbling speeds (5, 10, 15 and 20 rpm) during 12 h intermittent tumbling (10 min/h) on the characteristics of a restructured cured beef product were studied. There were no difference ($P > 0.05$) among the various treatment means for yield. Hunter color scores, voids between chunks of meat, handling-ability or Kramer shear values. Meat tumbled at 15 and 20 rpm had higher ($P < 0.05$) Instron values than the meat tumbled at 5 or 10 rpm. However, 20 rpm produced more ($P < 0.05$) extracted protein on the meat surface than 5 rpm. In summary, 5, 10 and 15 rpm produced satisfactory products, although 15 rpm had greater binding ability. AS

- 1151 Miles (CW), Bodwell (CE), Morris (E), Ziayd (JA), Prather (ES), Mertz (W) and Canary (JJ). Long-term consumption of beef extended with soy protein by men, women, and children. I. Study design, nutrient intake-

es, and serum zinc levels. *Qualitas Plantarum - Plant Foods for Human Nutrition* 37(4); 1987; 341-359

This paper presents the effects of long-term consumption of beef extended with soy proteins on the serum Zn levels and Fe status of children, women and men and the effects of consumption of Fe, and Zn fortified beef extended with soy protein on these parameters. Results indicated no deleterious effects on the serum Zn levels when subject consumed beef extended with soy protein for 180 days. BV

- 1152 Morris (ER), Bodwell (CE), Miles (CW), Mertz (W), Prather (ES) and Canary (JJ). Long-term consumption of beef extended with soy protein by children, women and men. III. Iron absorption by adult men. *Qualitas Plantarum - Plant Foods for Human Nutrition* 37(4); 1987; 377-389

The data reported in this part indicate that the consumption of soy-extended beef had no detrimental effect on iron status of adult men if consumed in mixed diets. BV

- 1153 Park (JW), Lanier (TC), Keeton (JT) and Hamann (DD). Use of cryoprotectants to stabilize functional properties of prerigor salted beef during frozen storage. *Journal of Food Science* 52(3); 1987; 537-542

Cryoprotectants significantly improved the maintenance of water holding capacity (WHC) gel forming ability and protein solubility properties of both salted prerigor and postrigor beef. Addition of NaCl to comminuted muscle accelerated the destabilization of the muscle proteins during frozen storage with respect to the WHC, gel-forming ability and protein solubility. This destabilization was reduced by polydextrose or a mixture of sucrose and sorbitol (1:1) sucrose/sorbitol mixture was most effective. As evidenced by the parameters investigated, the quality of prerigor salted muscle treated with cryoprotectants and stored for 6 months was approx. equal to that of untreated postrigor meat prior to freezing. BV

- 1154 Savell (JW), Branson (RE), Cross (HR), Stiffler (DM), Wise (JW), Griffin (DB) and Smith (GC). National consumer retail beef study: Palatability evaluations of beef loin steaks that differed in marbling. *Journal of Food Science* 52(3); 1987; 517-519, 532

A nationwide study was conducted to detect differences in palatability of beef steaks that differed in marbling by consumers rather than sensory panelists. Regional consumer preferences for steaks that contained high, medium or low levels of marbling was also investigated. BV

- 1155 Young (LL), Searcy (GK), Blankenship (LC), Salinksy (J), Hamm (D), Wilson (R) and Willis (BW). Variability of selected components in mechanically separated beef. *Journal of Food Science* 52(3); 1987; 530-532

Mechanically separated beef samples contained consistently 30% or less fat and 14% or more protein. Wide variations was found in the content of other components. Three variations was between products

from different plants and also due to differences in input materials and equipments. Variations attributable to sampling were less than 20% of the total. The results indicate variances in non proximate components can be controlled by careful selection of input materials. BV

Bovines

- 1156 Laser Reuterswärd (A), Skog (K) and Jägerstad (M). Mutagenicity of pan-fried bovine tissues in relation to their content of creatine, creatinine, monosaccharides and free amino acids. *Food and Chemical Toxicology* 25(10); 1987; 755-762
- 1157 Zarkadas (CG), Marshall (WD), Khalili (AD), Nguyen (Q), Zarkadas (GC), Karatzas (CN) and Khanizadeh (S). Mineral composition of selected bovine, porcine and avian muscles, and meat products. *Journal of Food Science* 52(3); 1987; 520-525

Variations in mineral composition of young and old avian muscles, immature bovine and porcine tissues destined for processing and in selected meat products and additives was determined. Muscle-to-muscle variation was found to be highly significant for all but one of the minerals analysed in the avian (K) and bovine (P) muscle tissues and all but three (Fe, Ca, P) in the porcine tissues. Variations in mineral content among typical meat products resulting from the type of animals, specific meat cuts and amounts of ingredients used to formulate these products. This information is useful for assessing the content of the essential minerals and nutritional quality of meats and meat products. BV

Steers

- 1158 Miller (GJ), Field (RA), Medieros (L) and Nelms (GE). Lipid characteristics in fresh and broiled loin and round steaks from concentrate fed and pasture grazed steers. *Journal of Food Science* 52(3); 1987; 526-529

Broiling of loin and round steaks from concentrate-fed and pasture grazed steers had no significant effects upon levels of intramuscular triglycerides or cholesterol when expressed on a freeze-dry basis. Broiling did cause increase in phospholipids and free fatty acids. Broiling did not influence fatty acid compositions of triglycerides, polar lipids and free fatty acids. Loin steaks contained more triglycerides and free fatty acids and less phospholipids and cholesterol than round steaks. Increases in intramuscular triglycerides were not accompanied by increases in cholesterol or phospholipids. Polyunsaturated/saturated acid ratios and levels of linoleic acid, on n-3 acid, were highest in steaks from steers that had grazed pastures

Pork

- 1159 Shahidi (F), Rubin (LJ) and Wood (DF). Control of lipid oxidation in cooked ground pork with antioxidants and dinitrosyl ferrihemochrome.

Journal of Food Science 52(3); 1987; 564-567**Meat products**

- 1160 Laser Reuterswärd (A), Skog (K) and Jägerstad (M). Effect of creatine and creatinine content on the mutagenic activity of meat extracts, bouillons and gravies from different sources. **Food and Chemical Toxicology** 25(10); 1987; 747-754

Frankfurters

- 1161 Saliba (DA), Foegeding (EA) and Hamann (DD). Structural failure and non destructive rheological analyses of frankfurter batters: Effect of heating rates and sugars. **Journal of Texture Studies** 18(3); 1987; 241-259

The effects of heating rate and sugar concn. on the rheological properties of frankfurter batters were characterised, rheological properties determined by structural and non failure analyses and methods for interpretation of texture profile analyses parameter were compared in these studies. Results showed that heating rate and sugar concn. had a greater effect on stresses than strains. It was found that a thermal scanning rheology monitor was able to measure rheological changes during thermal processing. NGKR

Ham

- 1162 Pinedo (R), Pilkington (D) and Foegeding (PM). KCl in dry cured hams: Effect on trichinae devitalization and chemical and physical properties. **Journal of Food Science** 52(3); 1987; 554-557, 563

Thirty trichinae-infected hams were dry-cured under laboratory conditions for 62 and 69 days using three curing formulations which included the partial (0%, 25% and 50%) substitution of NaCl by KCl. Each treatment rendered the product free of viable trichinae. Sixty commercial hams were processed at a dry-cured ham plant. A high incidence of spoilage (62%) was observed among hams commercially processed. The degree of spoilage appears to be associated with the final sodium plus potassium content of the product. The study suggests that potassium enhances the absorption of curing ingredients thus providing better protection against spoilage microflora. Under minimal processing condition, both NaCl and KCl have essentially the same ability to devitalize trichinae in dry-cured hams. AS

Poultry

- 1163 McNeill (J), Kakuda (Y) and Findlay (C). Effect of modified atmosphere blending on the oxidative stability and colour of frozen mechanically separated poultry meat. **Journal of Food Science** 52(3); 1987; 568-570, 583

The modified atm. mechanically separated poultry meat (MSPM) were found to be more stable than the control ($P < 0.05$). MSPM blended with atm. containing carbon dioxide were redder ($P < 0.01$) than the con-

trol, vacuum or nitrogen blended samples. BV

Chickens

- 1164 Waimaleongora-EkC), Chen (TC) and Alley (EG). Headspace volatiles of heated chicken frying shortening. *Poultry Science* 66(6); 1987; 1071-1074
- 1165 Young (LL), Lyon (CE), Searcy (GK) and Wilson (RL). Influence of sodium tripolyphosphate and sodium chloride on moisture-retention and textural characteristics of chicken breast meat patties. *Journal of Food Science* 52(3); 1987; 571-574

Sodium tripolyphosphate (STPP) and sodium chloride tended to increase the moisture retention and also affect the textural quality of the patties. The STPP increased the product cohesiveness, springiness and chewiness at the highest phosphate level in the absence of NaCl. The phosphate tended to increase cohesiveness and chewiness in the presence of NaCl at lower phosphate levels. Improved moisture retention and textural quality can be achieved by a better understanding of relationships between NaCl and STPP. BV

Poultry products

- 1166 Escalona (A) and Pesti (GM). Nutritive value of poultry byproduct meat. 3. Incorporation into practical diets. *Poultry Science* 66(6); 1987; 1067-1070

Studies were conducted to investigate the value of poultry by-product meal (PBPM) when incorporated into practical diets at low levels (5 to 10%). Samples from one plant, a Monday morning sample (fresh broiler waste) and a Friday afternoon sample (broiler and hatchery waste and dissolved air flotation sludge) were compared to a sample from another plant (fresh broiler waste). When the samples were incorporated at the 5% level into isocaloric, isonitrogenous corn-soy meal-based practical diets, no difference in 20-day gain or feed efficiency could be detected between the samples or in comparison with the effects of feeding an all-plant-based control diet in two experiments. Chick growth and feed efficiency were significantly depressed when PBPM was incorporated into the diet at the 10% level. AS

Eggs

- 1167 Bailey (JS), Fletcher (DL) and Cox (NA). Influence of added egg yolk on the microbiological quality of hard-cooked eggs stored in a citric acid/sodium benzoate solution. *Poultry Science* 66(5); 1987; 861-865

The effect of added egg yolk and the microbiological quality of the hard cooked eggs following equilibration and inoculation with known pathogen was studied. Results showed that hard coated egg preservative microbiological quality containing suspended egg yolk require higher citric acid concn. to assume microbiological quality of the stored product. MVG

- 1168 Lu (C-L) and Baker (RC). Effect of pH and food ingredients on the stability of egg yolk phospholipids and the metal-chelator antioxidant activity of phosvitin. *Journal of Food Science* 52(3); 1987; 613-616

Egg yolk phosvitin has been previously shown to inhibit metal catalyzed phospholipid oxidation. This study investigates the effect of pH and food additives (egg albumen and sodium chloride) on the antioxidant activity of phosvitin oxidative stability of yolk phospholipid. Phospholipids were stable at pH 6.1 and 7.8. However, phosvitin was unable to inhibit copper ion catalysis at pH 7.8. Neither sodium chloride nor albumin affected the stability of phospholipids or the activity of phosvitin in inhibiting ferrous ion catalysis at pH 6.1. BV

SEAFOODS

Crabs

- 1169 Moustafa (EC), Moharram (YG), El-Sokkary (I) and Telb (AI). Total mercury and its distribution in blue crab and deep water pink shrimp from Alexandria coast. *Nahrung* 31(8); 1987; 773-776

The results of this study indicate that the mercury content in the muscles and viscera of male and female blue crab (*Callinectes sapidus* Rothbun) and deep water pink shrimp (*Parapenaeus longirostris*) collected from Alexandria coast in the Mediterranean sea, differ according to fishing area, size, sex and species. The mercury content in the viscera of both the species was higher (75%) than that found in their muscles, indicating that mercury entered via the feed chain. BV

Fish

- 1170 Josephson (DB), Lindsay (RC) and Stuiber (DA). Enzymic hydroperoxide initiated effect in fresh fish. *Journal of Food Science* 52(3); 1987; 596-600

Enzymic formation of hydroperoxides was demonstrated in the emerald shiner (*Notropis antheroides*) and rainbow trout (*Salmo gairdneri*) by inhibiting the initial formation of hydroperoxides in fish homogenates with oxygenase activity inhibitors (stannous chloride; 10mM; aspirin, 40mM; potassium cyanide, 40 mM; microwave thermal denaturation). These treatments resulted in suppression of formation of both the volatile compounds responsible for fresh fish aromas and those derived from classic lipid autoxidation. Subsequent addition of hydroperoxides or peroxides into fish homogenates previously treated with enzyme inhibitor reinstated the formation of volatile compounds classically derived from autoxidation only. AS

- 1171 Knudsen (LB), Borresen (T) and Nielsen (J). Textural parameters in compression testing of a gel made from fresh and frozen fish mince. *Journal of Texture Studies* 18(3); 1987; 261-271

- 1172 Saheki (K). Comparative studies on the pre-enrichment media for the isolation of *Salmonella* in fish meal samples. *Bulletin of the Japanese Society of Scientific Fisheries* ('Nihon Suisan Gakkai-shi') 53(9); 1987; 1679-1685 (Ja).
- 1173 Tsumatani (K) and Ohta (F). Freezing points of blood serum and muscle juice in fish. *Bulletin of the Japanese Society of Scientific Fisheries* ('Nihon Suisan Gakkai-shi') 53(9); 1987; 1695 (Ja).

Carp

- 1174 Abe (H). Effect of growth on the concentration of L-histidine and serine in the white muscle of carp and rainbow trout. *Bulletin of the Japanese Society of Scientific Fisheries* ('Nihon Suisan Gakkai-shi') 53(9); 1987; 1657-1661 (Ja).

Sardines

- 1175 Asahara (M). Antioxidant effects of natural tocopherol mixture, calcium phytate and inositol on marinated sardine. *Bulletin of the Japanese Society of Scientific Fisheries* ('Nihon Suisan Gakkai-shi') 53(9); 1987; 1617-1621 (Ja).

Salted fillets of sardine (*Sardinops melanosticus*) dipped in pickling solutions with and without added antioxidants and stored at 3 C for 200 days. Peroxide value (POV), carbonyl value (COV), TBA value and acid value (AV) were determined during storage on the lipids of the samples. In samples treated with the pickling solution containing either 0.10% inositol or 0.05% calcium phytate, the lipid oxidation was slow. Tocopherol mixture (0.05%) was fairly effective in protecting the lipid oxidation, especially in combination with inositol and/or calcium phytate. The effect of 0.05% tocopherol mixture combined with 0.10% inositol on the stability of linoleic acid at 40 C, was similar to that of 0.05% tocopherol mixture alone; inositol did not show any synergistic effect on protection of linoleic acid oxidation. BV

Seabreams

- 1176 Morishita (T), Uno (K), Imura (N) and Takahashi (T). Variation with growth in the proximate compositions of cultured red seabream. *Bulletin of the Japanese Society of Scientific Fisheries* ('Nihon Suisan Gakkai-shi') 53(9); 1987; 1601-1607 (Ja).

Reports the variations in chemical composition of cultured Red seabream (*Chrysophrys major*) in relation to growth; feed or water temp. in their living habitat. Results indicate crude protein contents increase with growth less significantly, whereas lipid contents showed significant variation with growth (less in March to May and more in June to August). The key factors of variations in the lipid contents was due to water temp. BV

- 1177 Uno (K), Morishita (T) and Takahashi (T). Variation with growth in the fatty acid compositions of lipids from cultured red seabream. *Bulletin*

of the Japanese Society of Scientific Fisheries ('Nihon Suisan Gakkai-shi') 53(9); 1987; 1609-1615 (Ja).

Tunas

- 1178 Chow (C-J), Ochiai (Y), Watabe (S) and Hashimoto (K). Autoxidation of bluefin tuna myoglobin associated with freezing and thawing. *Journal of Food Science* 52(3); 1987; 589-591, 625

Bluefin tuna oxymyoglobin (oxyMb) solutions were frozen either quickly at -80°C or slowly at -20°C , thawed, and the metmyoglobin (metMb) to total myoglobin (Mb) ratio (metMb%) determined. When quick freezing was applied, autoxidation was clearly pH-dependent, with a min. (metMb%, 15-40) at around pH 5.9-6.3. When slowly frozen and thawed, on the other hand, tuna Mb generally showed an extremely high metMb%. Freezing and thawing partially insolubilized tuna Mb, depending upon pH. The Mb showed the min. ratio of insolubilization at pH 6-6.3 again. AS

- 1179 Draughon (FA), Tavangaran (M) and Hitchcock (J). Histamine production in soy extended tuna salads. *Journal of Food Science* 52(3); 1987; 584-588, 595

Textured soy protein (TSP, 15% or 30%) when added to tuna salads developed toxic levels of histamine ($> 50\text{ mg}/100\text{ g}$) at either 24°C or 37°C for 6 h. Non extended tuna salads did not develop toxic levels of histamine even when inoculated with known histamine-producing bacteria and held at 24°C or 37°C for 48 h. 30% TSP in tuna salads resulted in higher initial pH and favourable growth conditions for microorganisms and histidine decarboxylase activity. BV

- 1180 Gill (TA), Thompson (JW), Gould (S) and Sherwood (D). Characterization of quality deterioration in yellow fin tuna. *Journal of Food Science* 52(3); 1987; 580-583

The spoilage pattern of thawed yellowfin tuna carcasses was examined and appropriate objective indicators of quality assessment for both raw material and finished product was determined. The results of the study suggest that the major mode of spoilage of brine frozen yellow fin appeared to be autolytic rather than microbiological. The post-mortem age of raw material could be estimated by detn. of the inosine monophosphate ratio of the finished product. BV

- 1181 Suzuki (T), Hirano (T) and Suyama (M). Changes in extractive components of white and dark meats of bigeye tuna by thermal processing at high temperature of F value of 4. *Bulletin of the Japanese Society of Scientific Fisheries* ('Nihon Suisan Gakkai-shi') 53(9); 1987; 1633-1636

White and dark meats of bigeye tuna were packed in retortable pouches and thermally processed at 120°C , 110°C , and 100°C so far as to reach the equal lethality of F 4, and the changes in extractive components of both meats were studied. As compared with the short time of heating at high temp.; the long time of heating at low temp.

produced more intense browning of the meat extract, decrease in trimethylamine oxide, creatine, and total sugar, and increase in trimethylamine, creatinine, gelatin, and non-protein nitrogen. The decomposition of histidine and anserine, and the formation of gelatin in the dark meat were much greater than those in the white meat. AS

- 1182 Watanabe (E), Nagumo (A), Hoshi (M), Konagaya (S) and Tanaka (M). Microbial sensors for the detection of fish freshness. *Journal of Food Science* 52(3); 1987; 592-595

The preparation of microbial sensor and its application to the detn. of fish freshness is studied. A microbial sensor system consisting of immobilized living spoilage causing bacteria, *Alteromonas putrefaciens* and an oxygen electrode was prepared and applied to the continuous detn. of fish freshness. Freshness of bluefin tuna (*Thunnus thynnus orientalis*) and yellow tail (*Seriola quinqueradiata*) meats stored in ice for up to 2 wk was determined by both the proposed and the conventional K value enzyme sensor method. Good comparative results were obtained and the microbial sensor system could determine fish freshness more rapidly and precisely. BV

Fish products

Surimi

- 1183 Kim (JM) and Lee (CM). Effect of starch on textural properties of surimi gel. *Journal of Food Science* 52(3); 1987; 722-725

The proportion of amylose and amylopectin, and the rheological behaviour of eight starches were correlated with the textural properties of starch-containing surimi gels. Findings included the following increased firmness and cohesiveness with increase in water-holding ability and viscosity of the starch; increased expressible moisture and penetration force with an increase in the amylose fraction due to increased retrogradation; increased tensile force with an increase in the amylopectin fraction; and increased cohesiveness and chewiness after refrigerated storage for all starches with a greater increase for high amylose starches. Surimi gels containing potato starch were the firmest and most cohesive. The textural properties of starch-containing surimi gel correlated well ($r = 0.90$ to 0.97 , $P < 0.05$) with the viscosity of starch paste if 100% amylopectin-containing and pregelatinized starches were excluded from the correlation. AS

Mussels

- 1184 Musgrave (MA), Gould (SP) and Ablett (RF). Enzymatic lipid peroxidation in the gonadal and hepatopancreatic microsomal fraction of cultivated mussels (*Mytilus edulis* L.). *Journal of Food Science* 52(3); 1987; 609-612

An active lipid peroxidizing enzyme system was investigated in microsomal fraction isolated from the gonad and hepatopancreatic tissue of live cultivated mussels. Enzyme-mediated lipid peroxidation

was detected in gonad microsomes and was shown to be dependent upon the presence of NADH, ADP, and Fe ions. A marked increase in the peroxidizing capacity of gonadal microsomes was observed following liquid emulsion loading. Fresh microsomes prepared from hepatopancreatic tissue showed no detectable levels of lipid peroxidizing activity. However, freeze-thaw treatment of microsomes from both gonadal and hepatopancreatic tissues resulted in an initiation of activity in the hepatopancreatic tissue and increased the existing activity of the gonad microsomes. AS

PROTEIN FOODS

Infant foods

- 1185 Rao (BVR) and Mathur (BN). Development of a pre-term infant formula. Part II. Effect of forewarming temperature on physical changes during storage. *Indian Journal of Dairy Science* 40(2); 1987; 254-260

Infant formula intended for the dietary management of pre-term and small-per-term infants was manufactured by employing forewarming temp. of 95 and 110 °C. The products prepared by employing both temp. were acceptable in terms of retention of colour characteristics throughout the storage period of 12 months, although the product prepared by forewarming at 110 °C showed comparatively greater shift in the reflectance of wavelengths in the range of 650-800 nm, corresponding greater shift in the reflectance of wavelengths to the yellow and red hues during storage. Higher forewarming temp. tended to enhance the solubility index and sinkability while dispersibility and wettability tended to reduce with the progress of storage period. On the whole, the reconstitution properties were within acceptable range in both types of products prepared by forewarming at 95 to 110 °C AS

- 1186 Rao (BVR) and Mathur (BN). Development of a pre-term infant formula. Part I. Effect of forewarming temperature on physical characteristics. *Indian Journal of Dairy Science* 40(2); 1987; 249-253

The present study was directed at the comparative evaluation of the forewarming temp. of 95 and 110 °C with regard to reconstitution characteristics, maintaining other manufacturing parameters such as standardization, concn., homogenization, incorporation of additives and spray drying conditions at pre-determined levels. Higher forewarming temp. favoured superior attributes of bulk density, flowability and wettability in the final product. On the other hand the product obtained by employing lower forewarming temp. was superior in terms of the dispersibility, solubility index and sinkability. AS

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

- 1187 Reineke (W). Regeneration of the washing liquor of bottle cleaners in the beverage industry. *Lebensmittelindustrie* 34(4); 1987; 157-159 (De).

Discusses the problems in reuse of used bottles in the beverage industry, application of flocculation technology in a caustic cleaning process plant for the cleaning of the washing liquor and advantages of its application. BV

Alcoholic beverages

Beer

- 1188 Hayes (PJ), Smyth (MR) and McMurrough (I). Comparison of electrochemical and ultraviolet detection methods in high-performance liquid chromatography for the determination of phenolic compounds commonly found in beers. Part 2. Analysis of beers *Analyst* 112(9); 1987; 1205-1207

Report on the application of the method to the analysis of some Irish-brewed beers. The results indicated that electrochemical detection was more suitable than UV detection with respect to sensitivity and selectivity. BV

- 1189 Hayes (PJ), Smyth (MRS) and McMurrough (I). Comparison of electrochemical and ultraviolet detection methods in high-performance liquid chromatography for the determination of phenolic compounds commonly found in beers. Part 1. Optimisation of operating parameters. *Analyst* 112(9); 1987; 1197-1204

Wines

- 1190 Eschenbruch (R). Can the grape grower contribute towards lower sulphur dioxide levels in wine? *American Journal of Enology and Viticulture* 38(1); 1987; 78-79
- 1191 Heard (GM) and Fleet (GH). Occurrence and growth of killer yeasts during wine fermentation. *Applied and Environmental Microbiology* 53(9); 1987; 2171-2174

Reproducible differences in colony morphology of several killer sensitive strains of *Saccharomyces cerevisiae* were noticed and these findings were exploited to quantitatively monitor these strains during wine fermentation. MVG

- 1192 Heymann (H) and Noble (AC). Descriptive analysis of commercial Cabernet Sauvignon wines from California. *American Journal of Enology and Viticulture* 38(1); 1987; 41-44

Twenty-one Cabernet Sauvignon wines were evaluated by descriptive analysis. The intensity of eleven flavour attributes differed significantly across wines. The largest difference between wines were the contrast between vegetative and fruity flavours as shown by principal component analysis(PCA). Vine age showed a significant positive correlation with intensity of berry aroma and significant negative correlations with the intensities of green bean aroma and vegetative flavour by mouth. Significant negative correlations were also found between the temp. zone of growing area and the intensities of eucalyptus aroma and vegetative flavour by mouth. Thus in this data set, younger vines and vines growing under cooler conditions produced wines which were more vegetative in flavour. AS

- 1193 Hsu (J-C) and Heatherbell (DA). Heat-unstable proteins in wine. I. Characterization and removal by bentonite fining and heat treatment. *American Journal of Enology and Viticulture* 38(1); 1987; 11-16

Nature of unstable proteins and their removal by bentonite fining and heat treatment by applying improved sensitive techniques (electrophoresis electric focussing) for the detection and characterisation of proteins and glycoproteins are reported. MVG

- 1194 Moore (LF), Bates (RP) and Marshall (MR). A direct HPLC analysis of total sulphur dioxide in wine. *American Journal of Enology and Viticulture* 38(1); 1987; 28-34

A rapid (< 25 min) method for detn. of total sulphur dioxide in must or wine has been developed employing a Dionex 2010 ion Chromatograph with anion exchange column and conductivity detector. A distillation step is avoided by diluting the filtered sample with 0.1 N NaOH 0.1% formaldehyde to a sulphur dioxide level of 5 to 25 mg/L and eluting with a carbonate/bicarbonate buffer (pH 9.6). Recovery, from sulphite-spiked must samples by ion chromatography was 94% to 118%. High performance liquid chromatography-ion chromatography (HPLC-IC) analysis measured 83% to 110% total sulphur dioxide compared to the official Modified Monier-Williams method, and the results were not significantly different ($P < 0.01$). With attention to sample dilution and detector attenuation, sulphate, tartrate, and malate can be determined simultaneously, making this a useful technique for following sulphur dioxide throughout winemaking cellar treatment, and storage, as well as characterising acid profiles. AS

- 1195 Noble (AC) and Shannon (M). Profiling Zinfandel wines by sensory and chemical analyses. *American Journal of Enology and Viticulture* 38(1); 1987; 1-5
- 1196 Singleton (VL). Oxygen with phenols and related reactions in musts, wines and model systems: Observations and practical implications. *American Journal of Enology and Viticulture* 38(1); 1987; 69-71

Non-alcoholic beverages

Fruit juices

- 1197 Niwa (M), Matsuoka (M), Nakabayashi (A), Shinagawa (K), Tsuchid (F), Saitoh (Y) and Katayama (H). Lactic acid fermentation of fruit juices by lactic acid bacteria. *Chemie Mikrobiologie Technologie der Lebensmittel* 11(3); 1987; 81-88 (De).

New fermented beverages of fruit juices by lactic acid bacteria were studied. The results indicate (1) Fruit juice contain bacteriostatic substance, which restrain the multiplication of lactic acid bacteria. (2) The bacteriostatic substances were mainly polyphenols. (3) The bacteriostatic substances could be removed by proteins or PVPP. (4) By investigating the diacetyl production in lactic fermented fruit juices, beverages with 10^5 - 10^7 viable cells/mL of lactobacilli but low diacetyl concn. were produced and (5) On the basis of these data, new fermented beverages of fruit juices were developed which have wine-like taste and flavour. AS

- 1198 Terre (E). Extended experience with ultrafiltration in fruit juice plants. *Flussiges Obst* 54(8); 1987; 437-438
- 1199 Vogt (K). New ways in processing hazy apple juice concentrates. *Flussiges Obst* 54(8); 1987; 438-439

The use of ultrafiltration in processing hazy apple juice conc. and the possibility of secondary haze formation is described. The use of PUPPC (a synthetic resin powder) for juice stability is suggested. BV

Apple juices

- 1200 Sheu (MJ), Wiley (RC) and Schlimme (DV). Solute and enzyme recoveries in apple juice clarification using ultrafiltration. *Journal of Food Science* 52(3); 1987; 732-736

Enzyme treated apple juices, obtained after pressing on a commercial processing line, were clarified by UF using a plate and frame system. The 50,000 mol. wt. cut-off membranes operated at 50 °C and 5 bar pressure yielded average recovery of 99.6% and 99.3% soluble solids and titratable acids, resp. in the permeate and rejected 36.3% of the residual pectinase activity which was available for possible reuse. Proper membrane cleaning to maintain high flux was very important in UF clarification; a 1% Ultrasil solution was more efficient than a 0.1% NaOH solution and reduced need for centrifugation and/or vacuum filtration prior to UF. AS

- 1201 Wakayama (T) and Lee (CY). Factors influencing the clarification of apple juice with honey. *Food Chemistry* 25(2); 1987; 111-116

In this investigation 6 var. of apples were studied to determine the effect of pH, degree of browning and polyphenol composition on

clarification of apple juice with addition of honey . The optimum pH was found to be about 3.5 and only browned apple juices which are prepared without ascorbic acid precipitated with the honey and hence clarified and the precipitation time was inversely proportional to the degree of browning of all apple var. except Golden Delicious. It was also seen that there is no relation between the clarification rate and the different phenolic groups present in the apple juices. NGKR

Citrus juices

- 1202 Mannheim (CH), Miltz (J) and Letzter (A). Interaction between polyethylene laminated cartons and aseptically packed citrus juices. *Journal of Food Science* 52(3); 1987; 737-740

The quality of citrus juices aseptically packed into laminated cartons and glass jars was evaluated at three temp. Model solutions were used to elucidate effect of contact surface on components in the product. The extent of browning and loss of ascorbic acid was found to be greater in cartons than in glass. The d-limonene content of the juices in cartons was reduced by about 25% within 14 days of storage due to absorption by the polyethylene. Sensory evaluation showed a significant difference after 10-12 wk between juices packed in glass and cartons stored at ambient temp. AS

Grape juices

- 1203 Hsu (JC), Heatherbell (DA), Flores (JH) and Watson (BT). Heat-unstable proteins in grape juice and wine. II. Characterization and removal by ultrafiltration. *American Journal of Enology and Viticulture* 38(1); 1987; 17-22

Effect of nominal mol. wt . cut off and the effect of ultrafiltration (UF) as a bentonite substitute has been investigated. UF is combined by bentonite fining to further characterise the nature of unstable proteins in wine. MVG

Grapefruit juices

- 1204 Fellers (PJ), Carter (RD) and de Jager (G). Influence of limonin on consumer preference of processed grapefruit juice. *Journal of Food Science* 52(3); 1987; 741-743, 746

A batch of frozen concn. grapefruit juice (GJ) was reconstituted with limonin addition to produce 5 juice containing from 2.3 (control) to 11.0 p.p.m limonin, 10 Brix, and 8.5 Brix: percent acid. Consumers evaluated the juices for flavour and 5 additional quality attributes, and juice preference. Flavour means varied within an acceptable range and were affected negatively by limonin concn. GJ users rated products significantly higher than did nonusers. Preference by users and nonusers was least for the highest limonin content juice. Bitterness and tartness perception increased with increasing limonin content whereas sweetness perception decreased. All samples were judged somewhat too bitter and tart, and not quite sweet enough. AS

Soft drinks

- 1205 Lau (OW) and Luk (SF). Iodimetric method for the determination of sorbic acid in soft drinks. *Analyst* 112(9); 1987; 1269-1272

The iodimetric method described is based on the quantitative reaction between sorbic acid and N - bromosuccinimide in water-acetic acid medium. A known quantity of excess N- bromosuccinimide is added to brominate sorbic acid and the excess N-bromosuccinimide is then allowed to react with iodide to liberate iodine which is subsequently titrated with standard thiosulphate solution. Optimum bromination conditions were assessed and the recoveries of sorbic acid at concn. of 36-385 $\mu\text{g ml}$ ranged from 95 to 104%. Extraction of sorbic acid, dimethyl ether and back-extraction of the acid with sodium hydrogen carbonated solution minimised the interferences from a number of common food additives. The method can be applied to various synthetic and real soft drink samples. MVG

Tea

- 1206 Spiro (M), Price (WE), Miller (WM) and Arami (M). Kinetics and equilibrium of tea infusion: Part. 8. The effects of salts and of pH on the rate of extraction of theaflavins from black tea leaf. *Food Chemistry* 25(2); 1987; 117-126

The rates of extraction of theaflavins from various blends of tea leaves have been measured at 80 °C with a set of aqueous salt and buffer solutions giving a pH range of 3.1 to 8.1. It was seen that there was no effect on adding electrolytes but considerable decrease in rate occurred in the presence of calcium chloride. This is found to be due to the partial dissociation of the theaflavins at higher pH and the greater diffusion coeff. of the resulting ionic salt. These findings are found to be significant in regard to tea brewing and to industrial extraction of theaflavins. NGKR

FATS AND OILS

- 1207 Warwel (S), Doring (N) and Biermanns (FJ). The influence of protecting groups in the metathesis of oleochemicals. *FAT Science and Technology* 89(9); 1987; 335-338 (De).

Fats

- 1208 Homberg (E) and Bielefeld (B). Comparative determinations of the sterol content in fats and oils. Part. II. Enzymatic and colorimetric methods. *FAT Science and Technology* 89(9); 1987; 353-355 (De).

Methods of enzymatic and colorimetric determination of sterol have been investigated for analytic insufficiency, specificity facing sterols and for secondary reactions by sterol accompanying components. Three modifications of an enzymatic method and one colorimetric method have been tested on five different fats. Under optimal test condi-

tions the results were partly good, partly satisfactory in comparison to the results of the digitonin precipitations. AS

Fatty acids

- 1209 Stage (H). Optimal conditions for fatty acid distillation and fractionation in relation to energy consumption, product quality, yield and environmental load. *FAT Science and Technology* 89(9); 1987; 345-352

Lipids

- 1210 Schuch (R) and Ahmad (F). Structure and biological significance of triacylglycerols containing cyclopropene acyl moieties. *FAT Science and Technology* 89(9); 1987; 338-339

Physiological and toxicological properties of lipids of various plants, including sources of edible fats, such as cottonseed and kapok, containing cyclopropene acyl moieties have been reviewed and a novel method for the analysis of such triacylglycerols is presented. BV

Oils

- 1211 Blaskovits (A), Gampe (L), Ruby (M) and Borvendeg (J). Absorption of vitamin A dissolved in various oils and fatty acids of different chain length in rats. *Acta Alimentaria* 16(4); 1987; 331-337

Liver concn. of vitamin A dissolved in various oils and fatty acids of different chain length were studied in rats. It was found that the absorption and accumulation in the liver of vitamin A dissolved in various edible oils depended largely on the oil used. A correlation was established between the fatty acid composition of the oils and accumulation of vitamin A in the liver. Triglycerides formed from shorter chain fatty acids are easily absorbed, thus, vitamin A dissolved in them accumulates in greater amount in the liver. If vitamin A was dissolved in the fatty acids then the difference in the absorption influencing effect on the different chain length fatty acids diminished or even ceased. This observation suggests that the biological utilization of vitamin A depends largely on the digestibility of the oil used as solvent. AS

- 1212 Viplava Prasad (U), Divakar (TE), Hariprasad (K) and Sastry (CSP). Spectrophotometric determination of some antioxidants in oils and fats. *Food Chemistry* 25(20); 1987; 159-164

New spectrophotometric methods for the detn. of antioxidants (tertiary butylhydroquinone, BHA and gallic acid) have been developed using 3-methyl-2-benzothiozolinone hydrazone hydrochloride (MBTH) and ceric ammonium sulphate. MBTH is oxidised and its resonance products are complexed with antioxidants to give coloured compounds which can be determined by colorimeter. This method was found to be sensitive, reproducible, accurate and applicable to the estimations of antioxidants in oils and fats. NGKR

Essential oils

Orange oils

- 1213 Ferrer (OJ) and Matthews (RF). Terpene reduction in cold-pressed orange oil by frontal analysis-displacement adsorption chromatography. *Journal of Food Science* 52(3); 1987; 801-805

Investigates the preparation of an enriched oxygenated flavour fraction from cold-pressed Valencia orange oil by column adsorption chromatography using either silica gel or florisil as adsorbents and avoiding the use of nonpotable solvents and to characterise the products recovered from the adsorption column qualitatively and quantitatively by capillary gas chromatographic analysis and mass spectrometry. BV

Soybean oils

- 1214 Mistry (BS) and Min (DB). Isolation of Sn-Alpha-monolinolein from soybean oil and its effect on oil oxidative stability. *Journal of Food Science* 52(3); 1987; 786-790

The oxidative stability of soybean oil could be enhanced by minimizing the formation of monolinolein or eliminating it by proper processing. BV

- 1215 Mistry (BS) and Min (DB). Effects of fatty acid on the oxidative stability of soybean oil. *Journal of Food Science* 52(3); 1987; 831-832

Effect of 0, 0.5 and 1.0% levels of stearic, oleic, linoleic or linolenic acid or octadecane on the oxidative stability of soybean oil were determined by a combination of peroxide values and measurements of volatile compounds and oxygen in the headspace of samples by gas chromatography. These fatty acids showed similar prooxidant activities which were not statistically different at Alpha = 0.05. However, octadecane which had the same number of carbons as stearic, oleic, linoleic or linolenic acid but no carboxylic group, did not show prooxidant activity. AS

SPICES AND CONDIMENTS

- 1216 Munasiri (MA), Parte (MN), Ghanekar (AS), Sharma (A), Padwal-Desai (SR) and Nadkarni (GB). Sterilization of ground prepacked Indian spices by gamma irradiation. *Journal of Food Science* 52(3); 1987; 823-824, 826

A dose of 10 KGY was found to be effective in destroying the bacteria in prepacked spices without affecting their quality attributes. A dose of 5 KGY eliminated mold contamination during a six-month storage study of irradiated and unirradiated spices, the irradiated spices were found to retain their quality. BV

SENSORY EVALUATION

- 1217 Mackey (KL), Morgan (RG) and Steffe (JF). Effects of shear-thinning behaviour of mixer viscometry techniques. *Journal of Texture Studies* 18(3); 1987; 231-240
- 1218 McCarthy (OJ). Large deformation testing of solid foods. *Food Technology in New Zealand* 22(8); 1987; 14-15, 19

This article describes briefly some of the results obtained with torsion test by NCSU and illustrates the value of the test with respect to understanding structural failure and measuring texture at Massey university. The torsion testing is relatively inexpensive to set up for food industry use. An expensive instrument like the Ferranti-Shirely viscometer is not necessary. BV

- 1219 Ofoli (RY), Morgan (RG) and Steffe (JF). A generalized rheological model for inelastic fluid foods. *Journal of Texture Studies* 18(3); 1987; 213-230

A generalised viscometric model which is more flexible over existing models in characterising fluid food even for large ranges of shear rates has been presented. This four parameter model was found to accurately measure shear stress versus shear rate, and apparent viscosity versus shear rate. Useful for materials like ketchup, mustard apricot puree, miracle whip, and milk chocolate coating. By appropriate specification of the four parameters of the model conventional rheological models used in fluid food analyses can be obtained from the generalised equation. NGKR

- 1220 Siegel (SF) and Risvik (E). Cognitive set and food acceptance. *Journal of Food Science* 52(3); 1987; 825-826

A consumer panel was randomly divided into two groups. Each group was asked to rate the acceptance of an almond nut dairy bar on five consecutive days and to complete a 30-item questionnaire about their current physical state. For the positive group, all the statements were positive (e.g., "I feel great"), while for the negative group all the statements were negative (e.g., I feel tired). Acceptance ratings of the dairy bars were significantly higher for the positive group than for the negative group but questionnaire responses did not change over the five days of the experiment. AS

FOOD STORAGE

Nil

INFESTATION CONTROL AND PESTICIDES

Nil

BIOCHEMISTRY AND NUTRITION

Biochemistry

- 1221 Gazzani (G), Vagnarelli (P), Cuzzoni (MT) and Mazza (PG). Mutagenic activity of the Maillard reaction products of ribose with different amino acids. *Journal of Food Science* 52(3); 1987; 757-760

Mutagenic activity of Maillard browning products from ribose-lysine and glucose-lysine mixtures, heated at 100 C, was evaluated with the *Salmonella* assay. For both mixtures optimal conditions for producing mutagenic derivatives were observed at equimolar concn. of reactants. Ribose-lysine browning products showed a higher mutagenic activity than the glucose-lysine mixture and were more active in inducing gene conversion and mitotic crossing-over in *Saccharomyces cerevisiae*. The higher mutagenic activity of the browning products of ribose was also demonstrated with several amino acid; alanine, asparagine, aspartic acid, cysteine, cystine, leucine, methionine, phenylalanine, proline, hydroxyproline, serine, and valine. A DNA-damaging activity of the browning mixtures of ribose with histidine, proline, hydroxyproline, valine, was also detected in the *Bacillus subtilis* "recassay". AS

- 1222 Petzke (KJ) and Albrecht (V). Nutritional influence on the metabolism of glycine. *Nahrung* 31(2); 1987; 157-172 (De).

It is concluded that the metabolism of glycine is localized mainly in liver tissue. The main catabolic pathway of nutritional glycine proceeds via the glycine-cleavage enzyme, serine hydroxymethyltransferase and serine dehydratase or serine-pyruvate aminotransferase and via serine and pyruvate. The physiological significance of this metabolic pathway is estimated. The catabolism via the C pool is limited by the regeneration rate of tetrahydrofolic acid. Other pathways (via glyoxylate, SHEMIN-cycle, aminoacetone cycle) are only of minor significance for the catabolism of glycine originating from food. AS

Proteins

- 1223 Nzomiwu (NR) and Obizoba (IC). Nutritional responses of rats fed mixtures of plant and animal proteins. *Qualitas Plantarum - Plant Foods for Human Nutrition* 37(4); 1987; 313-319

Rats were fed mixtures of sorghum (S), pigeon pea (PP), bread fruit (TAP) plus crayfish (CF) to provide 1.6 g N/100 g of daily diet for a 35 days study period. Combination of PP :CF caused increases in

N intake and retention, wt. gain and PER higher than for those of the other test groups. Its values for N intake and retention, and BV were higher than for those of the control except for food intake, NPU, wt. gain and PER. Substitution of CFG(20%) with TAP and PP as supplements to S decreased food intake, wt gain and PER and increased N intake, digested and retained N, NPU and BV. The results appear to indicate that (a) PP : CR blend was better than other blends as judged by the parameters, and (b) TAP and PP were superior to CF alone as supplement to S. AS

- 1224 Schwenke (KD), Ya), Grinberg (V), Danilenko (AN), Burova (TV) and Tolstoguzov (VB). On the acceptability of the two-state model of protein unfolding to the 11S globulins from plant seeds, *Nahrung* 31(2); 1987; 183-184 (De).

Vitamins

Tocopherols

- 1225 Furuya (T), Yoshikawa (T), Kimura (T) and Kaneko (H). Production of tocopherols by cell culture of safflower. *Phytochemistry* 26(10); 1987; 2741-2747

TOXICOLOGY

- 1226 Roche (MO), Castillo (A), Gonzlez (T), Grillo (M), Rios (J) and Rodriguez (N). Effect of ascorbic acid on the hepatotoxicity due to the daily intake of nitrate, nitrite and dimethylamine. *Nahrung* 31(2); 1987; 99-104 (De).

The purpose of this study was to investigate hepatotoxicity due to the daily intake of nitrates and nitrites administered to rats during 14 wk together with dimethylamine in drinking water and to evaluate the protecting effect of ascorbic acid against the hepatotoxicity of the presumably endogeneous formed dimethylnitrosamine. The results gave evidence of hepatotoxicity induced by the intake of nitrate, nitrite and dimethylamine all together, and not through the only intake of nitrate or nitrite or of amine. Daily doses of ascorbic acid (211 plus or minus 40) and (18 plus or minus 4 mg/kg) seemed to hinder hepatotoxicity according to the criteria under investigation. BV

Bacteria

Staphylococcus

- 1227 Noleto (ALS), Malburg (LMJr) and Bergdoll (MS). Production of staphylococcal enterotoxin in mixed cultures. *Applied and Environmental Microbiology* 53(10); 1987; 2271-2274

Results obtained when *Staphylococcus aureus* strains producing enterotoxin A were incubated with other food microorganisms like

Bacillus cereus, *Streptococcus faecalis*, *Escherchia. coli* and *Pseudo-monas aeruginosa* in laboratory medium (brain-heart injuries broth and a meat medium broth) are presented. It was concluded that enterotoxin production is unlikely in mixed cultures unless *Staphylococcus* out numbers other contaminating microorganisms. MVG

Mycotoxins

- 1228 Muller (Th). Carcinogenicity and genotoxicity of mycotoxins. *Nahrung* 31(2); 1987; 117-125 (De).

Aflatoxin B is the most potent hepatocarcinogen among the naturally occurring compounds. Its carcinogenic effect was confirmed by long term-studies in several animal species. There exists detailed knowledge on the molecular mechanism of the carcinogenic effect caused by aflatoxin B₁. At present there does not exists a reliable evidence that human primary hepatocellular carcinoma is caused by aflatoxins. Sterigmatocystin is a hepatocarcinogen too. The genotoxicity of sterigmatocystin likewise as of aflatoxin B₁ was detected by shortterm-tests with microbial systems and mammalian cells in vitro. It is disputable whether ochratoxin A, citrinin and T-2 toxin are carcinogenic or not. Diacetoxyscirpenol, zearalenone and patulin are estimated as not carcinogenic after longterm-studies with oral toxin administration. Patulin and penicillic acid are genotoxic in microbial systems resp in mammalian cells in vitro. Luteoskyrin is carcinogen, but that was not detected any genotoxicity. AS

Aflatoxins

- 1229 Hamid (AB) and Smith (JE). Degradation of aflatoxin by *Aspergillus flavus*. *Journal of General Microbiology* 133(8); 1987; 2023-2029

Aflatoxin degradative activity was demonstrated in 6- to 12-d-old intact mycelium and cell-free extracts of *Aspergillus flavus*. The addition of cycloheximide, SKF 525-A or metyrapone to cultures of *A. flavus* prevented subsequent degradation of the aflatoxins, while in cell-free extracts degradation was inhibited by SKF 525-A, metyrapone and cytochrome C but not by KCN. In cell-free extracts, aflatoxin degradation was enhanced by NADPH and NaIO₄. The results suggested that involvement of cytochrome P-450 monooxygenases in the aflatoxin degradative acitivity of *A. flavus*. AS

Deoxynivalenol

- 1230 Schuster (M), Lepschy (J), Biber (A), Engelhardt (G) and Wallnofer (PR). Production of mycotoxins by *Fusarium* species isolated in Germany. 2. Time course of deoxynivalenol and 3-acetyldeoxynivalenol formation by *Fusarium graminearum* in different liquid media. *Zeitschrift fur Lebensmittel-Untersuchung und -Forschung* 185(6); 1987; 477-480

Trichothecene

- 1231 Chelkowski (J) and Visconti (A). Preliminary observation on seasonal changes of trichothecene mycotoxin production by Fusaria. *Nahrung* 31(2); 1987; 173-174 (De).

FOOD LAWS AND REGULATIONS

Nil

GENERAL

- 1232 Toyoda (M), Kobayashi (K), Mitsura (A), Saito (Y), Uno (K) and Sakabe (Y). Estimation of daily intake of chloroform by Japanese housewives *Journal of Food Safety* 8(4); 1987; 219-224

In order to obtain data on the daily dietary intake of chloroform in Japan a method has been devised to estimate the chloroform concn. in 24 h duplicate portion diets consumed by 21 housewives for 3 consecutive days in Japan by electron capture gas chromatography after carrying distillation by heating under nitrogen gas flow of the samples and by this method chloroform was confirmed after GC-MS. The results showed that the concn. of chloroform in each of the 24 h duplicate meals were found to be in the range of 1.7 to 45.8 p.p.b and the average concn. was found to be 13.7 plus or minus 9.6 p.p.b. The daily dietary intake of chloroform by housewives were in the range of 7.5 to 51.9 µg and the mean intake was 26.4 plus or minus 11.8 µg. NGKR

FOOD PROCESSING

- 1233 Kovalev (NI), Karzeva (NJ) and Fiterer (VO). Optimization of cooking recipes as to their protein content by computation. *Nahrung* 31(9); 1987; 905-911

The authors propose a calculated protein utilization coeff.. This coeff. considers the difference between the utilization rates of the proteins being contained in the mixture and their amino acid composition. The proposed formula allows calculations by computer. The data obtained show high correlations with the results received by biological tests with *Tetrahymena* cultures. AS

Aseptic processing

- 1234 Sastry (SK) and Zuritz (CA). A review of particle behaviour in tube flow: Applications to aseptic processing. *Journal of Food Process Engineering* 10(1); 1987; 27-52

This review discusses literature on solid liquid flow in tubes including capsule flow, effects on bends radial migration phenomena, particle-particle interactions, modeling studies and other topics which may have a bearing on particle velocities in holding tubes, etc. NGKR

Extrusion

- 1235 Steffe (JF) and Morgan (RG). On-line measure of dynamic rheological properties during food extrusion. *Journal of Food Process Engineering* 10(1); 1987; 21-26

Using a Rheometrics on-line Rheometer an instrument designed for rubber and plastics applications the dynamic rheological properties of extruded rice dough were measured continuously and the results on storage and loss moduli were successfully measured over a moisture range of 24-50% wet basis. However, this instrument was found to be difficult to be used in food research due to numerous problems and need was stressed to produce an on line rheometer acceptable to the food extrusion industry. NGKR

Extrusion cooking

- 1236 Guzman-Tello (R) and Cheftel (JC). Thiamine destruction during extrusion cooking as an indicator of the intensity of thermal processing. *International Journal of Food Science and Technology* 22(5); 1987; 549-562

Assessment of the intensity of high temp.-short time (HTST) extrusion cooking was studied by measuring the extent X_A of thiamine destruction. Small quantities of thiamine hydrochloride (0.1 - 0.7 g/100g) were mixed with wheat flour (containing 14% water) prior to extrusion experiments. Results indicate that thiamine destruction follows an apparent first-order reaction and that the rate constant K of destruction, calculated from near isothermal extrusion experiments at 133, 142 or 152 C (product temp.), follows an Arrhenius relationships with an activation energy of 49.9 kJ/mol. K values were calculated from experimental detn. of X_A and of the residence time distribution (RTD) in the effective heating zone of the extruder. KAR

FOOD PACKAGING

- 1237 Prattley (C), Sumner (J), Warne (D) and Garwood (A). An integrated thermoform packaging system for controlled atmosphere (CA) packaged foods. *Food Technology in Australia* 39(10); 1987; 492-494

FOOD ENGINEERING AND EQUIPMENT

Engineering

- 1238 Balaban (MO), Zuritz (CA), Singh (RP) and Hayakawa (K-I). Estimation of heat of moisture sorption and improved criteria for evaluation-moisture sorption isotherm equations for foods. *Journal of Food Process Engineering* 10(1); 1987; 53-70

- 1239 Barbosa Canovas (GV), Malave-Lpez (J) and Peleg (M). Density and compressibility of selected food powders mixtures. *Journal of Food Process Engineering* 10(1); 1987; 1-19

In this study the density and compressibility of various mixtures of granular and powdered sucrose, granular malic acid, soy protein and corn starch at 1:3, 1:1 and 3:1 were determined and compared to those of the pure components. It has been shown that the bulk density and compressibility of binary mixtures of various compositions can change in different ways depending in particle size and the moisture content of the mixture. None of the mixtures studied had density that exceeded that of its components and interparticle void filling was not a dominant factor that affected the mixtures density. NGKR

- 1240 Lacroix (C) and Castaigne (F). Simple method for freezing time calculations for brick and cylindrical shaped food products. *Canadian Institute of Food Science and Technology Journal* 20(5); 1987; 342-349

A simple model is proposed to estimate freezing times of brick and cylindrical shaped foodstuffs. This model combines Plank's equation for the phase change period with the unsteady heat transfer solutions for cooling periods before and after phase change. The total freezing time is obtained by the detn. and the summation of the pre-cooling, change phase and tempering times. The results produced show good agreement with experimental data for a wide range of conditions. All calculations are easily programmable on scientific calculators such as an HP 41C, allowing simple, fast and accurate prediction of freezing times of foodstuffs. AS

- 1241 Lilley (TH). Criticism of a proposed corrected form of the Ross equation and suggested extension of the equation. *International Journal of Food Science and Technology* 22(5); 1987; 563-567

ENERGY IN FOOD PROCESSING

- 1242 Gunasekaran (S). Optimal energy management in grain drying. *CRC Critical Reviews in Food Science and Nutrition* 25(1); 1986; 1-48

Presents a thorough review of current literature on grain-drying procedures such as high temp. drying, low or no heat drying, combination of high and low temp. drying, layer drying, drying intermittently with rest periods, cyclic drying, dryeration, recirculating the dryer exhaust air, stir drying and use of grain preservatives. Drying with alternate energy sources such as solar and biomass energy and use of heat pumps are also reviewed. Computer controls application for energy efficient drying is discussed. Emphasis is given on these drying procedures in the light of their energy savings and adoptability, quality of dried grain and overall systems costs, possible future options and trends are considered. 273 references. BV

FOOD CHEMISTRY AND ANALYSIS

Chemistry

- 1243 Palacha (Z) and Flink (JM). Revised PEC method for measuring water activity. *International Journal of Food Science and Technology* 22(5); 1987; 485-490

The Proximity Equilibration Cell (PEC) method of Lenart & Flink (1983) for measuring water activity in foods was revised by improving equilibration cell design and cell handling procedures. Calibration methods were changed to eliminate time and temp. variation effects on measured water activity. The PEC cells are inexpensive, easy to use and can measure water activity over the range 0.4 - 1.0, although accuracy is greatly improved above 0.6. In a study of osmotic concn. of apple (Palacha & Flink, 1987) over 1000 water activity measurements were made over a 3-month period. Values of water activity for raw apple (0.985) and sucrose osmosis solutions were in good agreement with literature values. AS

Chemistry (Analytical)

- 1244 Kok (MF), Yong (FM) and Lim (G). Rapid extraction method for reproducible analysis of aroma volatiles. *Journal of Agricultural and Food Chemistry* 35(5); 1987; 779-781

In this study a simple rapid method for extraction of volatile compounds from an aqueous sample using a liquid liquid extractor has been described using N-pentane as the solvent for the volatile extraction and subjecting the extract to high resolution GLC. without further concn. Linalool and 1-heptanol were used as model components. The average recoveries were found to be 20 plus or minus 2% and 5 plus or minus 1% resp. By addition of 5% NaCl to the aqueous sample the recovery was found to increase to 30 plus or minus 2% and 10 plus or minus 2% resp. NGKR

- 1245 Rangaswamy (JR), Vijayashankar (YN) and Prakash (SR). Colorimetric method for the determination of carbendazim (MBC), Benomyl and their degradative product 2-amino-benzimidazol. *Journal of Food Science and Technology, India* 24(6); 1987; 309-311

In the new method, methanol after oxidation to formaldehyde, was coupled with chromotropic acid reagent and determined. The method estimated as low as 1.5 μ g methanol. On alkaline iodination 2-amino-benzimidazol (2 AB) forms reddish brown N-iodo-2-AB with an absorption max. at 400 nm and serves as a measure of MBC with a lower determinable limit of 3 μ g. MVG

- 1246 Srivastava (A) and Singh (SK). Determination of vitamin C in chemical, pharmaceutical and biological samples by spectrophotometric titrimetry with o-diacetoxiodobenzoate. Analysis of mixtures of vitamin C with methionine and cysteine or glutathione. *Analyst* 113(2); 1988; 259-267

A method has been developed for the detn. of vitamin C in pharmaceutical preparations, foodstuffs and biological fluids based on titrimetry with o-diacetoxiodobenzoate (o-DIB) with spectrophotometric (max. 600 nm) or visual detection of the end-point using leuco-2, 6-dichlorophenolindophenol and potassium iodide as indicator. Sulphur-containing amino acids such as cysteine and glutathione interfere quantitatively and can be masked by cyanoethylation; the cyanoethylated product and methionine have also been determined with o-DIB in the presence of acidified potassium bromide with methyl red as indicator. Procedures are given for the analysis of mixtures of vitamin C with sulphur-containing amino acids. The effect of a number of interferents has also been studied. AS

- 1247 Tsuda (T), Wada (M), Aoki (S) and Matsui (Y). Determination of inorganic tin in biological samples by hydride generation-atomic absorption spectrometry after silica gel cleanup. *Journal of the Association of Official Analytical Chemists* 71(2); 1988; 373-374

A method is described for the detn. of inorganic tin in biological samples by hydride generation-atomic absorption spectrometry (HG-AAS). A sample is extracted with ethyl acetate after addition of HCl and NaCl. The concentrated extract is passed through a silica gel column. The column is washed with ethanol, water, and 0.2N HCl successively, and then inorganic tin is eluted with 2N HCl and measured by HG-AAS. Recoveries from fish muscle spiked with 0.1 μ g/g Sn are 78.9 plus or minus 4.2% (average plus or minus standard deviation, n = 5). The detection limit is 0.01 μ g as Sn. AS

FOOD MICROBIOLOGY AND HYGIENE

Ethyl alcohol

- 1248 Belghith (H), Romette (J-L) and Thomas (D). An enzyme electrode for on-line determination of ethanol and methanol. *Biotechnology and Bioengineering* 30(9); 1987; 1001-1005
- 1249 Mullins (JT) and NeSmith (CC). Acceleration of the rate of ethanol fermentation by addition of nitrogen in high tannin grain sorghum. *Biotechnology and Bioengineering* 30(9); 1987; 1073-1076

Bacteria

Bacillus amyloliquefaciens

- 1250 Yoo (YJ), Cadman (TW), Hong (I) and Hatch (RT). Kinetics of Alpha amylase synthesis from *Bacillus amyloliquefaciens*. *Biotechnology and Bioengineering* 31(4); 1988; 357-365

The microbial production of Alpha-amylase from *Bacillus amyloliquefaciens* was investigated. The microorganism was grown using media containing glucose or maltose at 37 °C and under aerobic conditions in

a 126-L fermentor. The Alpha-amylase synthesis from maltose was not found to be inducible but was found to be subject to catabolite repression. The maltose uptake rate was observed to be the rate-limiting step compared to the conversion rate of maltose to glucose by intracellular Alpha-glucosidase. The Alpha-amylase activity achieved with maltose as a substrate was higher than that achieved with glucose. A slower growth rate and a higher cell density were obtained with maltose. The enzyme production pattern depended upon the nutrient composition of the medium. AS

Clostridium botulinum

- 1251 Ferreira (JL), Hamdy (MK), Zapatka (FA) and McCay (SG). Plasmids of *Clostridium botulinum* type A, B, E, F, and other clostridial species. *Journal of Food Safety* 8(4); 1987; 267-277

Fungi

Mushrooms

- 1252 Yamashita (I), Takahashi (T), Shimoda (T), Kikuchi (M) and Shibata (S). Changes in some chemical characteristics in Shiitake mushroom during modified atmosphere packaging storage and on exposure to air. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi)' 34(12); 1987; 834-839 (Ja).
- 1253 Zurera-Cosano (G), Rincon-Leon (F) and Pozo-Lora (R). Lead and cadmium content of some edible mushrooms. *Journal of Food Quality* 10(5); 1987; 311-317

Truffles

- 1254 Bokhary (HA), Sulieman (AAA), Basalah (MO) and Parvez (S). Chemical composition of desert truffles from Saudi Arabia. *Canadian Institute of Food Science and Technology Journal* 20(5); 1987; 336-341

Paper and gas-liquid chromatographic (GLC) analyses of soluble carbohydrates of truffles *Tirmania nivea*, *Tirmania pinoyi* and *Terfezia boudieri* revealed the presence of glycerol, glucose, fructose, mannitol, inositol and trehalose in varying quantities. Acid hydrolysis of insoluble carbohydrates yielded a mixture of monosaccharides. Out of a total of thirty amino acids detected, twenty-two were found in *T. nivea*, twenty in *T. pinoyi* while twenty-three amino acids were present in *T. boudieri*. Five organic acids were detected in all three truffles. Free organic acids, bound organic acids and total acid content were low in *T. nivea* and *T. pinoyi*, but high in *T. boudieri*. Manganese, copper, sodium, calcium, potassium, iron, magnesium, phosphorus and cobalt were present in varying amounts in the species of *Tirmania* and *Terfezia*. AS

- 1255 Talou (T), Delmas (M) and Gaset (A). Principal constituents of black truffle (*Tuber melanosporum*) aroma. *Journal of Agricultural and Food Chemistry* 35(5); 1987; 774-777

A dynamic headspace technique employed for isolating black perigord truffle (*Tuber melanosporum*) aroma volatiles using a Tenax trap and the volatiles eluted from the trap by heat desorption revealed 14 compounds by capillary G.L.C coupled with GLC-MS out of these volatiles 9 compounds have been described to be black perigord truffle aroma constituents for the first time. Alcohols also were found to be predominant. NGKR

Yeasts

- 1256 Slaughter (JC) and McKernan (G). The influence of pantothenate concentration and inoculum size on the fermentation of a defined medium by *Saccharomyces cerevisiae*. *Journal of the Institute of Brewing* 94(1); 1988; 14-18.

Laboratory fermentations were carried out using defined media containing from 0.02 to 0.04 mg pantothenate l^{-1} and a brewing strain of *Saccharomyces cerevisiae* at inocula of 1×10^6 to 1×10^7 cells ml^{-1} cell size. Increase in cell number, increase in yeast wt. production of ethanol, n-propanol, isobutanol, isoamyl alcohol, acetaldehyde and ethyl acetate were measured. All the properties were influenced to some extent by pantothenate concn. and/or inoculum size. At high inoculum levels variation in the pantothenate concn. above 0.1 mg ml^{-1} did not have a major effect on the total quality of volatile compounds produced but did alter the relative proportions of the individual compounds. AS

- 1257 Sturley (SL) and Young (TW). Extracellular protease activity in a strain of *Saccharomyces cerevisiae*. *Journal of the Institute of Brewing* 94(1); 1988; 23-27

The isolation and analysis of a strain of laboratory yeast with extracellular protease activity is described. The proteolytic activity found in culture supernatants. The extracellular proteases were heterogeneous in composition, consisting of possibly 3 aberrantly secreted intracellular proteinases. NGM

- 1258 Szczodrak (J) and Targonski (Z). Selection of thermotolerant yeast strains for simultaneous saccharification and fermentation of cellulose. *Biotechnology and Bioengineering* 31(4); 1988; 300-303

Cellulose bioconversion to ethanol combining saccharification of this substrate by cellulases with simultaneous fermentation of hydrolysates by yeast has been studied. This investigation has been carried out to find strains of yeast that could produce ethanol at 40 C and above. A total of 58 yeast strains from 12 genera were assayed for their ability to grow and ferment carbohydrate in standard Durham tube test at 40, 43 and 46 C. Chosen strains of *Fabospora fragilis* CCY51-1-1 produced 56.0 and 35.09 ethanol/L from 140g glucose/L at 43 and 46 C in less than 48 h. resp. *Trichoderma reesei* cellulase preparation (400 FPU/L) had no distinct effect on ethanol yield and biomass in first 12 h fermentation at 46 C. It was found that *Fabospora fragilis* did not grow or produce ethanol at 46 C as the initial ethanol concn. was over 40g/L. GAR

Candida curvata oil

- 1259 Leman (J), Bednarski (W), Tomasik (J) and Borejszo (Z). Production and composition of oil from *Candida curvata* D. *Acta Alimentaria Polonica* 13(1); 1987; 75-83

A strain of the yeast *Candida curvata* D was cultured on deproteinized whey medium. The effect of temp. and acidity on oil biosynthesis yields as well as on lactose utilization and reduction of chemical oxygen demand in the past-culture effluent was studied. KAR

Saccharomyces cerevisiae

- 1260 Cason (DT), Reid (GC) and Gatner (EMS). Pitching rates related to glucose and fructose utilisation in *Saccharomyces cerevisiae*. *Journal of the Institute of Brewing* 93(6); 1987; 506-508

BIOTECHNOLOGY

- 1261 Burdick (BA) and Schieffer (JR). Production of speciality chemicals using immobilized whole cells in spiral-round bioreactors. 1. Aspartic acid and alanine production using cells immobilized in gelatin in nylon mesh. *Biotechnology and Bioengineering* 31(4); 1987; 390-395

Aspartic acid and alanine may be produced in either batch or continuous mode utilizing the immobilized cell membrane and bioreactor design described herein. The advantages include the ability to achieve well controlled, high cell densities in the membrane by the coating procedure; enzyme stabilization imparted through the immobilization process; and ease of product recovery/isolation using the spiral-round membrane bioreactor assembly. GAR

- 1262 Kung (C-M) and Baltzis (BC). Operating parameters' effect on the outcome of pure and simple competition between two populations in configurations of two interconnected chemostats. *Biotechnology and Bioengineering* 30(9); 1987; 1006-1018

Single cell proteins

- 1263 Omobuwajo (TO), Balogh (E) and Layokun (SK). The potential of corn straw for bioconversion to single cell protein. *Lebensmittel-Wissenschaft und-Technologie* 20(4); 1987; 191-194

The mineral-supplemented corn straw hydrolysate containing 7 g/l of reducing sugars was fermented separately with *Candida intermedia* and *Saccharomyces cerevisiae* and gave cell biomass yields of 5 and 3.5 g/l resp., representing 89% and 54% of the theoretical maxima. The results of this investigation indicate that the conversion of corn straw to single cell protein for use in human food applications is feasible. BV

TISSUE CULTURE

Nil

FOOD ADDITIVES

- 1264 Anvita Sinha. Food additives: A critical evaluation of regulation and enforcement mechanism in India. *Indian Food Packer* 42(1); 1988; 59-72

Food additives regulation and enforcement mechanism in India has been critically evaluated on the basis of a few case studies. KAR

- 1265 Yamaguchi (T). An absorptiometric method of food additives using polyamide film. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi)' 35(1); 1988; 45-47 (Ja).

An absorptiometric method was applied for the analysis of food dyes, sorbic acid (SHA), dehydroacetic acid (DHA) and P-hydroxy benzoic acid butylester (PHBB), by measuring the absorbances of the polyamide films (film) on which these food additives were adsorbed from their solutions in the presence of hydrochloric acid and sodium sulphate. This procedure was suggested to be useful for the analysis of food additives as they were easily adsorbed into the films. BV

Antioxidants

- 1266 Richards (JT) and Adams (FA). Study of reaction rates of the antioxidants gallic acid, BHT and BHA using the technique of pulse radiolysis. *International Journal of Food Science and Technology* 22(5); 1987; 501-508

This study investigates the antioxidant properties of the natural compound gallic acid, dispersed in water, using the technique of pulse radiolysis. The technique is also used to investigate the properties of the synthetic antioxidants BHA and BHT solubilized by dispersal in sodium dodecylsulphate (SDS) micelles. BV

Colorants

Dyes

- 1267 Singh (RL), Khanna (SK) and Singh (GB). Acute and short-term toxicity of a popular blend of metanil yellow and orange II in albino rats. *Indian Journal of Experimental Biology* 26(2); 1988; 105-111

Oral LD₅₀ values of the blend of metanil yellow and orange II in male and female rats were 6.50 and 5.66 g/kg body wt. resp. In short-term studies, rats were fed diet containing 0 (control), 0.1, 0.5 and 3.0% of the blend (W/W), daily for 90 days. Haematological

examination revealed a decreased erythrocyte count and haemoglobin content and an increased MCV suggesting macrocytic anaemia at the highest dose level of the blend. There was no change in the functioning of the liver. Histopathological examination of liver, heart, lung, kidney, adrenals, stomach, large and small intestine presented normal vascularity. Animals receiving 0.5 and 3.0% blend showed moderate splenomegaly. Testicular LDH, hyaluronidase and lactic acid registered a lowering in 3.0% blend fed animals reflecting a partial arrest of spermatogenesis. KAR

Flavourings

- 1268 Vernin (G), Parkanyi (C), Barone (R), Chanon (M) and Metzger (J). Computer-assisted organic synthesis of volatile heterocyclic compounds in food flavours. *Journal of Agricultural and Food Chemistry* 35(5); 1987; 761-768

This review covers a summary of several applications of computer assisted organic synthesis (CAOS) of volatile heterocyclic compounds and aromas. This represents a new approach and is the first attempt to summarise the efforts with several practical examples of formation of heterocyclic food flavours as studied by CAOS. NGKR

Vanillin

- 1269 Cooney (RV) and Ross (PD). N-Nitrosation and N-nitration of morpholine by nitrogen dioxide in aqueous solution: Effect of vanillin and related phenols. *Journal of Agricultural and Food Chemistry* 35(5); 1987; 789-793

Deals with the effects of vanillin and related phenolic compounds on the formation of N-nitrosomorpholine (NMOR) and N-nitromorpholine (NTMOR) from nitrite in aqueous solution. Possible reaction mechanisms are discussed as well as the potential role of dietary phenols in N-nitrosation reactions. NGKR

Sweeteners

- 1270 Thomson (DMH), Tunaley (A) and Van Trijp (HCM). A reappraisal of the use of multidimensional scaling to investigate the sensory characteristics of sweeteners. *Journal of Sensory Studies* 2(3); 1987; 215-230

CEREALS

- 1271 Lacey (J). The microbiology of cereal grains from areas of Iran with a high incidence of oesophageal cancer. *Journal of Stored Products Research* 24(1); 1988; 39-50

In north eastern Iran, where oesophageal cancer is common, grain was sampled from wheat and barley crops at harvest and after different periods of storage in underground pits or in buildings. At harvest, few grain samples were contaminated with *Fusarium* spp, or storage

fungi, apart from *Penicillium* spp but most yielded *Alternaria* spp, even after surface sterilization. Greater deterioration of stored grain occurred in underground pits than in buildings, with *Aspergillus restrictus* predominant. Occasionally, however, *Aspergillus glaucus* group (*Eurotium* spp), *A. candidus* and *A. flavus* were abundant. Ochratoxin was found in one sample; no other mycotoxins were detected although occasional samples showed unidentified toxicity to brine shrimp larvae. *A. flavus* and *A. ochraceus* produced aflatoxins and ochratoxin, resp. in culture. There was little evidence for mycotoxins being implicated in oesophageal cancer in north-eastern Iran. GB

- 1272 Naito (S) and Nanba (Y). The effect of ozone treatment on thiamin and riboflavin contents of cereal grains, cereal grain powders, peas, beans and whole spices. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi)' 34(12); 1987; 794-800 (Ja).

Cereal grains, cereal grain powders, peas, beans and whole spices were treated with ozone gas 0.5 - 50 p.p.m. temp. 5 -50 C for 1- 6 h and flow rate 100L/min. for its preservative effect. Results indicated 0.5 - 50 p.p.m ozone treatment was found to induce a little thiamin decomposition. Thiamin composition were detected in samples of buckwheat flour, well-milled glutinous rice flour and white pepper treated with 50 p.p.m ozone. When the ozone concn. was increased from 0.5 to 50 p.p.m thiamin retention decreased from 80 - 100% to 60 - 97%. Decomposition of water solution by ozone treatment was lowered by the addition of 1 - 5% saccharide, but was enhanced by the addition of 1 - 5% halogen compounds. There were no significant differences in the content of riboflavin by the ozone treatment of cereal grains, beans and whole spices. BV

- 1273 Naito (S), Okada (Y) and Sakai (T). Microbicidal properties of ozone on cereal grains, cereal grain powders, peas, beans and whole spices *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi)' 34(12); 1987; 788-793 (Ja).

Cereal grains, cereal grain powders, peas, beans and whole spices were treated with ozone gas (0.5-50 p.p.m, temp. 5-50 C for ;1-6 h and flow rate 100 L/min. for its preservative effect. Results indicated greater microbicidal effect on various cereal grain powder. When treated with higher concn. of ozone gas. When buckwheat whole grain with hull(Japan), black matpe and black pepper were treated with 5.0 p.p.m ozone, microbicidal effect of ozone was max. Microbicidal effect of ozone was max. in whole and min. in ground samples of buckwheat treated with 50 p.p.m ozone continuously for 1 h at 10 C. Lower temp. resulted in greater microbicidal effect on cereal grains, cereal grain powders, peas, beans and whole spices except black pepper. Longer contact time resulted in greater microbicidal effect on cereal grains, cereal grain powders, peas, beans and whole spices except buckwheat whole grain with hull and black matpe. BV

Barley

- 1274 Halsey (SA). Analysis of whole barley kernels using near infra-red reflectance spectroscopy. *Journal of the Institute of Brewing* 93(6); 1987; 461-464

A full scanning instrument was evaluated for the analysis of whole barley for moisture, total N and the potential hot water contact (i.e. without the need for malting or mashing). MVG

- 1275 Monnez (J), Flayeux (R), Muller (P) and Moll (M). An approach to the estimation of brewing quality in barley and malt. *Journal of the Institute of Brewing* 93(6); 1987; 477-486

Methods of assessing the brewing qualities of new varieties are reviewed. A new method for making this assessment is proposed. This is ideally a three-step process but it would be possible to eliminate the third, step without severe loss of effectiveness. The use of the new method is illustrated with reference to trials using 251 samples from recent trials in France. AS

Oats

- 1276 Wilhelm (E) and Kempf (W). Oats, barley and triticale. Properties and chances for the industrial starch production. *Starch/Starke* 39(5); 1987; 153-157

In preliminary investigation oats, barley and triticale were tested for the development of starch manufacturing processes. Cereal milling techniques and methods for separation of starch, protein and fibre were predominant with water extraction, screening and centrifugation techniques which can be realized in technical scale. Process water recycling, acid treatment and separation of proteins reduced COD values to 50%. Starches with high percentage of small granules will get more importance for the production of novel technical and chemical derivatives. Methods for concn. and isolation of fine fractions were studied and controlled by electron microscopy. The starches showed differences in stability to alkali treatment and in viscosity characteristics. AS

Paddy

- 1277 Birewar (BR). Improved methods for paddy storage at high moisture level in India. *Bulletin of Grain Technology* 25(3); 1987; 256-266

This review covers the various aspects of improved methods for storage of high moisture paddy in India. Aspects like storage facilities and performance; improved methods of storage on farm-level and commercial level including those of modern silo plant; paddy bulk storage structures; improvement of existing silo plant for bulk storage; are covered. NGKR

Rice

- 1278 De Angelis (RC), Giuli (GG) and Rogano (RN). Rice and beans. Effect of milk, mineral, and vitamin A, on weight gain, food intake, and body protein retention. *Archivos Latinoamericanos de Nutricion* 37(2); 1987; 312-323
- 1279 Inaba (H), Hatanaka (Y), Iimura (H), Matsumura (Y) and Mori (T). Production of rice cake doughs with a twin screw extruder and their retrogradation properties. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi)' 35(1); 1988; 15-22 (Ja).

As a new continuous and time-saving method of production of rice cake doughs, the extrusion cooking of the rice flour by use of a twin screw extruder is examined. The results showed that (1) the extrudates are almost the same quality as the products by an electric home use rice cake maker; (2) in case of extrusion cooking, the products made from the mixture of glutinous and non-glutinous rice flour (half-and-half) was more similar to the commercial cut rice cake than those made from the only glutinous rice flour on the results of sensory test; and (3) the measurement of degree of gelatinization (BAP method) and carbon-13 nuclear magnetic resonance spectra revealed that the products by extrusion cooking are slower in retrogradation speed during storage period of one month than those by the electric home use rice cake maker. BV

- 1280 Mossman (AP). A review of basic concepts in rice-drying research. *CRC Critical Reviews in Food Science and Nutrition* 25(1); 1986; 49-71

This review presents recent trends in rice-drying research. The scope of the review is limited to mechanical drying with hot air. Aspects covered include: uniformity, fissuring sequence, stress and plastic flow, diffusion mechanisms, temp. and other environmental factors, kernel vs. husk, controlled drying rate, chemical changes, dryer design, timing of harvest, trade-offs, reliability of data, and experimental design or approach. 83 references. BV

- 1281 Nigam (PN), Ram (DN), Verma (RA) and Uttam (JR). Relative resistance/susceptibility of rice varieties to *Sitophilus oryzae* Linn. *Bulletin of Grain Technology* 25(3); 1987; 231-234

Relative resistance/susceptibility of 15 rice var. against *Sitophilus oryzae* L. was investigated. Of these Ratna, T₅, IR 24 and Mashuri were most susceptible; Chakia 59, Akashi and Getu were least susceptible whereas Usar I, T₂₃, N 22, Madhukar, T₂₆, Saket 4, Prasad and Jaya were moderately resistant to the pest. NGKR

- 1282 Taira (H) and Lee (BY). Fatty acid composition of non-glutinous brown rice of Japonica type and Indica-Japonica hybrid type cultivars in Korea. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi)' 35(1); 1988; 23-27 (Ja).

The fatty acid composition of non-glutinous brown rice was

investigated on 15 Japonica type and 14 Indica-Japonica hybrid type cv. in Korea. The Indica-Japonica hybrid type, as compared with the Japonica type, gave significantly higher myristic, palmitic, palmitoleic, stearic, oleic and arachidic acid contents and lower linoleic and eicosenoic acid contents. As to the relationship between fatty acid contents, there were the highest and negative correlations between oleic and linoleic acids in both types. The scatter diagram between both fatty acid contents could be divided into Japonica type and Indica-Japonica hybrid type. The Indica-Japonica hybrid type in Korea, therefore, might inherit its fatty acid composition from Indica type. AS

Rice flour

- 1283 Tsuji (S). Physical properties of pastes of glutinous and non-glutinous rice flours. Part 1. Measurements of the physical properties of the paste of rice flour by using the multi-biting test. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi') 35(1); 1988; 40-44 (Ja).

Changes in the parameters of the multi-biting test of the 4.3% pastes of glutinous and non-glutinous rice flours heated for 5, 60 min. at four temp. levels (70, 80, 90 and 98 °C) showed the rheological differences due to the swelling and gelatinization characteristics of glutinous and non-glutinous rice flours. BV

Triticale

Triticale starch

- 1284 Gambus (H), Fortuna (T), Nowotna (A) and Palasinski (M). Physical properties of triticale starch. Part. I. Characteristic of starch pasting. *Acta Alimentaria Polonica* 13(1); 1987; 3-13

Starches of 53 Polish triticale breeding lines were investigated. Gelatinization characteristics and limiting viscosity of starch were determined. The studied properties of triticale starch are similar to those of wheat starch, although viscosities of triticale starch pastes were in the majority of samples higher than in the "Grana" wheat standard. In the total population tested, a few starches show a considerably low viscosity of starch pastes which may be a result of enzymatic degradation. AS

Wheat

- 1285 Khare (BP), Johari (RK) and Pant (S). Impact of Pelshenke value and grain weight of wheat varieties on relative resistance to *Sitophilus oryzae* Linnaeus. *Bulletin of Grain Technology* 25(3); 1987; 240-243

Studies were carried out to record the impact of Pelshenke value, initial moisture content and grain wt. on relative resistance of wheat var. to the attack of *S. oryzae*. The test was conducted with 24 wheat var. under laboratory conditions at 27 plus or minus 1 °C and 70 plus or minus 5% RH. The parameters tested were found to have

no effect on the relative resistance against the test insect. The var. K-123, 138, 140, 202, 207, 261 and K-306 were found to be least preferred while other 11 var. were either moderate or least preferred. The number of adults emerging varied from 34.00 to 59 in least preferred, 60 to 85 in moderate preferred and > 86 in highly preferred var. NGKR

- 1286 Sadouki (H) and Autran (JC). Implications of specific high-molecular-weight glutenins for baking quality of bread wheats grown in Algeria *Lebensmittel-Wissenschaft und-Technologie* 20(4); 1987; 180-190

The study of a collection of bread wheats bred or grown in Algeria allowed improved knowledge of the technological characteristics of these genotypes and confirmation of certain relationships between the various tests for baking quality assessment. A correlation was demonstrated and confirmed through principal-components analysis, between the presence of some specific high-mol.wt. gluten subunits detected by electrophoresis (SDS-PAGE) and the baking potential of Algerian genotypes. A positive role for subunits 1, 5-10 and 13-16 and a negative role for subunits 2-12 was evidenced and this is discussed in relation to breeding for quality. A study of the solubility characteristics of these subunits during gluten formation and heat treatment showed that, in most cases, those subunits whose presence was found to be positively correlated to high baking quality were also those that exhibited the higher tendency to form insoluble complexes. AS

- 1287 White (GG). Temperature changes in bulk stored wheat in sub-tropical Australia. *Journal of Stored Products Research* 24(1); 1988; 5-11

A simple simulation model has been presented to describe temp. changes observed during summer and autumn in three grain bulks in horizontal storages (perrin) in the sub-tropical region of Australia. The model included empirical descriptions of temp. of upper and lower surfaces and finite difference equations describing heat transfer by conduction. Grain temp. changes were primarily due to seasonal changes in ambient conditions which were transferred through the grain bulk by conduction. The grain harvested at 25 - 40 C. and stored under sub-tropical conditions remained at optimal temp. for development of *Rhipopertha dominica* and *Tribolium castaneum* the major pests of stored wheat. The model could be useful as a predictive tool for entomological purposes. Predicted temp. closely followed observed temp. Grain temp. 2 m from the surface changed little during summer and autumn and remained favourable for insect development at the start of winter. In one storage, heating associated with a heavy insect infestation raised temp. > 40 C. GB

- 1288 White (GG). Field estimates of population growth rates of *Tribolium castaneum* (Herbst) and *Rhyzopertha dominica* (F) (Coleoptera: Tenebrionidae and Bostrychidae) in bulk wheat. *Journal of Stored Products Research* 24(1); 1988; 13-22

Infestations of *Tribolium castaneum* and *Rhyzopertha dominica* were sampled in wheat in two horizontal bulk storages in sub-tropical

Australia. Exponential weekly rates of increase in adult numbers between sampling periods were 0.58 for *T. castaneum* and 0.41 for *R. dominica* in one storage during summer with initial conditions of 32 - 35 °C and about 11% grain moisture. The observed rate of increase throughout the bulk was within the range of published estimates of r_m and r_c for *T. castaneum*, and was slightly less than the estimate of r_m for *R. dominica*. The density of *T. castaneum* decreased from the central apex of the grain bulk towards the floor and edges, and the rates of increase were higher at the surface than deeper in the bulk. *R. dominica*, which may have been affected by insecticide residues on the grain, occurred mainly in localized patches throughout the bulk and rates of increase were relatively uniform. GB

Wheat starch

- 1289 Craig (SAS), Seib (PA) and Jay-Lin Jane. Differential scanning calorimetry properties and paper-strength improvement of cationic wheat starch. *Starch/Starke* 39(5); 1987; 167-170

Cationic derivatives of normal corn and wheat starch were produced and investigated. Differential scanning calorimetry showed that substitution lowered the starch gelatinization temp. the gelatinization endotherm, and the temp. of amylose-lipid V-complex dissociation. Substitution lowered the starch-iodine colour and inhibited precipitation of the amylose-alcohol complex by standard fractionation techniques. Cationic derivatives of normal corn and wheat starch gave similar improvement in dry strength of paper when added at the wet-end. AS

- 1290 Endo (S), Karibe (S), Okada (K) and Nagao (S). Factors affecting gelatinization properties of wheat starch. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi)' 35(1); 1988; 7-14 (Ja).

Japanese noodle making properties were compared between three Japanese var. and Australian standard white (ASW) wheat. The addition of NaCl to ASW and Japanese wheat flours showed pronounced difference under stickingout portion of Amylogram, during cooling. ASW flour which possessed favourable characteristics for noodle making showed large area and none or little area was covered in other var. This may relate to noodle quality. Further investigation on starches recovered from wet fractionation using 1% sodium dodecyl sulphate (SDS) on ASW flour showed high soluble proteins. 1% SDS treated starches resulted in minimised variance of gelatinization properties between ASW and Japanese wheat flours. On the basis of reconstitution of SDS treated starches and their solubles, unfavourable gelatinization in Japanese wheat flour were considered to be due to SDS solubles. SDS soluble proteins showed different protein characteristics by RP-HPLC methods. BHS

MILLETS

Corn

- 1291 Koll (P), Balarezo (S) and Lenhardt (H). Degradation of maize hulls with water in a flow reactor. *Starch/Starke* 39(1); 1987; 13-16
- 1292 Neucere (JN) and Zeringue (HJ Jr). Inhibition of *Aspergillus flavus* growth by fractions of salt-extracted proteins from maize kernel. *Journal of Agricultural and Food Chemistry* 35(5); 1987; 806-808

This paper reports the response of isolated protein to mycelial growth and sporulation of *A. flavus* in vitro. The maize kernels from open pollinated var. with extremes in aflatoxin contamination due to *A. flavus* infection namely yellow creole (highly resistant) and Huffman (highly susceptible) were tested. Assessment of lectin activity in pooled fractions from anion exchange chromatography showed correlation with fungal growth inhibition for yellow creole in solid media but not in liquid media. NGKR

- 1293 Samson (PR), Parker (RJ) and Keating (JA). Inactivation of fenitrothion on stored maize at different moisture contents. *Pesticide Science* 22(1); 1988; 83-92
- 1294 Wall (JS), Young (MR) and Carpenter (KJ). Transformation of niacin-containing compounds in corn during grain development: Relationship to niacin nutritional availability. *Journal of Agricultural and Food Chemistry* 35(5); 1987; 752-758

In this study the differences between the availability of niacin in mature field corn and niacin derivatives in sweet corn nutritionally to rats are investigated. The meals and extracts of field and sweet corn at various stages of grain development were analysed for total niacin and niacin containing compounds by TLC and HPLC. NAD and NADP were found to be the major compounds containing niacin. In both field and sweet corn in the milky stage NAD and NADP are found to be the major substances. The presence of nicotinic acid primarily NAD and NADP in milky sweet and field corn appears related to the biological availability of niacin in these grains and by maturity of the grains some niacin and nicotinic acid are formed and finally bound niacin and trigonelline predominated. NGKR

Corn Starch

- 1295 Abd Allah (MA), Mahmoud (RM), El-Kalyoubi (MH) and Abou Arab (AA). Physical properties of starches isolated from yellow corn, sorghum, Sordan and pearl millet. *Starch/Starke* 39(1); 1987; 9-12

Water-binding capacity, swelling power and solubility, amylograph viscosity, relative, specific, reduced and intrinsic viscosities of starches were investigated. Yellow corn and pearl millet starches were characterized by their higher water binding capacities. Pearl

millet starch showed higher initial transition temp. (about 91 C) to be gelatinized than the other starch which gelatinized at initial transition temp. ranging from 60 to 70 C. Difference in max. viscosities expressed as Brabender units were also ranging from 780 to 185 BU. On the other hand, slight differences in intrinsic viscosity were observed. BV

Corn starch

- 1296 Bhattacharya (M) and Hanna (MA). Textural properties of extrusion-cooked corn starch. *Lebensmittel-Wissenschaft und-Technologie* 20(4); 1987; 195-201

The textural properties of extrusion-cooked 30% and 1% amylase corn grits were affected significantly by the degree of cooking. Waxy corn (1% amylose) had higher puff ratios and water holding capacities but lower shear strengths and flow behaviour indexes than did 30% amylose corn. The linear effects contributed most to the general regression models of the linear terms, only product moisture content and extrudes barrel temp. were found to be significant. Scanning electron micrographs confirmed some of the findings. BV

Sorghum

- 1297 Shazali (MEH). The effect of site of entry on larval development of *Sitotroga cerealella* (Olivier) in sorghum grain. *Bulletin of Grain Technology* 25(3); 1987; 214-217

Sorghum grain was classified into large grain (30-42 mg wt. range) and small grain (17-25 mg wt. range) and were infested with *Sitotroga cerealella* larvae (0-24 h old) separately. The development period of *S. cerealella* which entered large grains through the germ was significantly shorter than that of those which entered the endosperm directly. In the small grain this difference was not significant. The difference in larval pupal period between the germ and endosperm entry sites in large grain was much less than that reported by earlier workers and this is attributed to higher temp., sorghum var. or the insect strain used for the study. KAR

PULSES

- 1298 Sone Lal, Doharey (RB) and Shiv Shanker. Field infestation of pulse beetles in Ghaziabad district. *Bulletin of Grain Technology* 25(3); 1987; 252-255

Field surveys conducted to study the infestation of pulse beetles in pea and Bengal gram in Ghaziabad district of Uttar Pradesh (India) during 1984 revealed that none of the samples examined soon after collection showed infestation of pulse beetle. After 2 months of incubation more infestation of pulse beetle was observed on pea than on Bengal gram and in samples collected from fields as well as from threshing yards. The infestation of *Callosobruchus chinensis* was

higher than that of *C. maculatus* on pea. NGKR

Black beans

- 1299 Plhak (LC), Stanley (DW), Hohlberg (AI) and Aguilera (JM). Hard-to-cook defect in black beans. Effect of pretreatment and storage condition on extractable phenols and peroxidase activity. *Canadian Institute of Food Science and Technology Journal* 20(5); 1987; 378-382

Broad beans

- 1300 Schneider (Ch), Schultz (M), Schmandke (H) and Borowska (J). Preparation of broad bean (*Vicia faba* L. minor) products. Part 3. Pretreatment of broad beans and broad bean flour-processes and effects. *Nahrung* 31(9); 1987; 863-868

Chickpeas

- 1301 Chavan (JK), Kadam (SS) and Salunkhe (DK). Biochemistry and technology of chickpea (*Cicer arietinum* L.) seeds. *CRC Critical Reviews in Food Science and Nutrition* 25(2); 1986; 107-158

This paper reviews briefly the classification, origin, production, and distribution of chickpeas; chemical composition (proteins, amino acids fractionation and characterisation of proteins, biological value, protein efficiency ratio, and digestibility); carbohydrates (starch, sugars, crude fiber, digestibility of carbohydrates); lipids; minerals; vitamins; antinutritional factors (protease inhibitors, oligosaccharides, tannins and amylase inhibitors) biochemical changes during grain development; storage; processing and utilization (milling; milling loss; cooking, germination, canning and dehydration) and food applications (composite flour, protein foods, bakery products) traditional products fermented foods, deep-fried products, sweetened products, puffed products, and soup mixes. 275 references. BV

- 1302 Singal (SK). Studies on the relative resistance on some genotypes of chickpea, *Cicer arietinum* L. to pulse beetle *Callosobruchus chinensis* (L). *Bulletin of Grain Technology* 25(3); 1987; 235-239

Relative resistance of twenty chickpea genotypes were tested against the infestation by *Callosobruchus chinensis* (L). No genotype was completely resistant to this beetle but difference were found in the extent of susceptibility. Genotype H-83-17 proved to be least susceptible on the basis of % adult emergence and growth index while H-84-43, H-83-152, and H-84-53 were highly susceptible. Positive correlation was found between adult emergence and wt. losses in all genotypes. NGKR

Green gram

- 1303 Adsule (RN), Kadam (SS) and Salunkhe (DK). Chemistry and technology of green gram (*Vigna radiata* (L.) Wilczek). *CRC Critical Reviews in Food Science and Nutrition* 25(1); 1986; 73-105

Discusses chemistry and technology of green gram (*Vigna radiata* (L). Wilezek). Aspects covered include: nutritional composition (carbohydrates, protein, lipids, minerals, vitamins and antinutritional factors); processing (milling, germination, cooking and roasting and frying); and utilization (traditional products, noodles, papad, fried green gram dhal, composite flours, weaning foods, protein isolates). 202 references. BV

OILSEEDS AND NUTS

- 1304 Sarkar (S) and Bhattacharyya (DK). Seed composition of some new varieties of sesame, toria, yellow sarson, mustard and groundnut. *Journal of the Oil Technologists' Association of India* 19(1); 1987; 13-15

Oil contents, iodine value, refractive index and fatty acid composition of (i) 3 var. of sesame, (*Sesamum indicum*) (ii) 5 var. of toria (*Brassica campestris* var. toria), (iii) 4 var. of sarson (*Brassica campestris* var. sarson), (iv) 6 var. of mustard (*Brassica alba*), and (v) 3 var. of groundnut (*Arachis hypogea*) are given. The oil content ranged from 38.4 to 41.3 in (i), 31.2 to 44.4 in (ii), 40.1 to 47.5 in (iii), 35.7 to 40.5 in (iv) and 40.0 to 41.5 in (v). Range variations were found in the fatty acid profiles of mustard, toria and sarson oils. In toria oil, linoleic acid ranged from 1-14.2%, in yellow sarson oil, 3.3-15.9% and in mustard oil, 3.2-19.6%. (ii), (iii) and (iv) generally contain about 50% erucic acid but some var. contain 60% erucic acid. KAR

Groundnuts

- 1305 Nagaraj (G) and Suneja (SK). A simpler method for preparation of fatty acid methyl esters of groundnut. *Journal of the Oil Technologists' Association of India* 19(1); 1987; 22-23

The proposed preparation of methyl ester, which is a prerequisite for the analysis of fatty acids through GLC, consists of adding 5 ml of 12% sulphuric acid in MeOH to 500 mg of finely powdered groundnut kernel taken in a centrifuge followed by incubation at ambient temp. for 3 h. It was centrifuged after adding 5 ml of hexane. The process of extraction with hexane is repeated twice. The hexane extract was evaporated and conc. to 0.5 ml and this methyl ester could be used in an AIMILNUCON gas chromatograph with DEGS column at 180 C. KAR

Hazelnuts

- 1306 Puiggali (JR), Batsale (JC) and Nadeau (JP). The development and use of an equation to describe the kinetics of air drying of hazelnuts. *Lebensmittel-Wissenschaft und-Technologie* 20(4); 1987; 174-179

A thin-layer drying equation is proposed for air drying of hazelnuts. It is used with a fixed deep-bed drier model to obtain a comparison with experimental results. The drying equation is then used

to develop a nomograph that provides the drying time for a given moisture content as a function of the drying air characteristics and the initial moisture content of the nuts. AS

Soybeans

- 1307 Davies (CS), Nielsen (SS) and Nielsen (NC). Flavour improvement of soybean preparations by genetic removal of lipoxygenase-2. *Journal of the American Oil Chemists' Society* 64(10); 1987; 1428-1433
- 1308 Lewis (DA). PSM- a new derivative from soybeans for wide ranging use in foods. *Food Technology in Australia* 39(10); 1987; 482-483, 491

PSM is a full-fat soy flour manufactured by a novel, patented process. It has many unique functional properties of value to the food industry. It is high in protein, free from cholesterol and bland in flavour; it may be used as a major ingredient in many food products. PSM may serve as an alternative to such items as milk solids, nuts, eggs, antioxidants, emulsifiers, and as a bulk ingredient in selected foods. A range of uses for PSM in foods is described. AS

- 1309 Rabasseda (J), Rauret (G) and Galceran (T). Liquid chromatographic determination of available lysine in soybean and fish meal. *Journal of the Association of Official Analytical Chemists* 71(2); 1988; 350-353

A method for the detn. of available lysine on the basis of the reactivity of the ϵ -amino group with fluorodinitrobenzene (FDNB) has been optimized. Hydrolysis is performed in closed vessels in an autoclave. Conditions for different meals were established by using a modified sequential simplex method. Hydrolysis for 4 h was sufficient for the meals studied-soybean and fish. The use of liquid chromatography to determine available lysine was studied, and optimum conditions were established for separation and quantitation of ϵ -DNB-lysine. The proposed method is faster, more accurate and more precise than commonly used methods. AS

- 1310 Snyder (HE), Sheu (G), Brown (HG), Clark (P) and Wiese (KL). Analysis of total oil in soybeans: A new equilibrium extraction method and the effect of particle size. *Journal of the American Oil Chemists' Society* 65(2); 1988; 255-257
- 1311 Taira (H) and Toriu (H). Effect of seeding time and cultivar on seed weight and proximate and fatty acid composition of soybean seeds. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi') 34(12); 1987; 809-817 (Ja).

Soy products

Soy milk

- 1312 deMan (L), deMan (JM) and Buzzell (RI). Composition and properties of soy milk and tofu made from Ontario light Hilum soybeans. *Canadian Institute of Food Science and Technology Journal* 20(5); 1987; 363-367

Protein, oil, sugars, phosphorus, potassium and magnesium contents were higher in the soy milk than in the original beans while calcium content was lower. Loss of solids from the beans during soaking was related to amount of water absorbed. Fatty acid analysis of the extracted fat revealed that 18:3 was negatively correlated with 18:1. All soybeans produced tofu of good texture. Composition of soy milk containing 6.25% total solids was compared with that of bovine and human milk. Soy milk was low in fat and mono to tetra saccharides but contained large amounts of carbohydrates of higher mol. wt. probably consisting of pectin and gums. BV

- 1313 Fuke (Y) and Matsuoka (H). Changes in proteins and protease activities during ripening of cheese-like product from soymilk using *Penicillium caseicolum*. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi') 34(12); 1987; 826-833 (Ja).

A curd coagulated by lactic fermentation from heated soy milk was ripened for 3 wk with inoculation of *Penicillium caseicolum*. Changes of proteins during the ripening were investigated by gel filtration and electrophoresis. The ratio of water soluble nitrogen to total nitrogen (ripening ratio) reached to approximate 60% at 2 wk's ripening and the finished product showed a good flavour and texture. Of water soluble nitrogen, lower mol. wt. components such as free amino acids and comparatively higher mol. wt. components consisting of partially hydrolyzed soy protein occupied about 30% and 70% resp. Electrophoretic analysis of curd proteins showed that subunits of 7S globulin and acidic subunits of 11S globulin decomposed in accordance with progress of ripening and bands of these subunits completely disappeared after 3 wk's ripening. Activities of neutral endopeptidase, aminopeptidases (I and II) and acid carboxypeptidase in curd appeared at 1 wk's ripening with growth of mold and rapidly increased with the ripening. These activities penetrated into center of portion of curd from surface. Proteases in curd and extracellular proteases of *P. caseicolum* which extracted from wheat bran medium were identical. AS

Soy proteins

- 1314 Oates (CG), Ledward (DA), Mitchell (JR) and Hodgson (I). Glutamic acid reactivity in heated protein and protein-alginate mixtures. *International Journal of Food Science and Technology* 22(5); 1987; 477-483

When heated at 185 °C for 35 min. only soy and gluten (out of seven proteins tested) produced measurable quantities of additional water. In the presence of 2% manucol DM (an alginate rich in mannuronic acid residues), the formation of water was markedly increased in the soy and gluten samples but not in the other proteins. Amino acid analysis showed that on heating soy in the presence of manucol DM, the glutamic acid content decreased whilst the aspartic acid content increased. When manugel GMB (an alginate rich in guluronic acid residues) was heated with soy, no loss of glutamic acid was observed and no additional water was formed. Experiments with single acids confirmed that the reaction giving rise to the formation of water primarily involved glutamic acid. The chemical reactivity of glutamic acid with

alginates rich in mannuronic acid residues explains the well-established effect of this type of polysaccharide in extrusion processing. In addition, the apparent reactivity of glutamic acid residues in these types of reactions may be a possible reason for the ease with which soy and gluten (proteins rich in glutamic acid residues) can be extruded, while proteins with less of these residues are more difficult to extrude. AS

Sunflower seed

- 1315 Anon. Food-grade protein from sunflowers. *Food Technology in Australia* 39(8); 1987; 383

TUBERS AND VEGETABLES

Root vegetables

Beet

- 1316 Wilkins (CK). Improved separations of beet pigments. *International Journal of Food Science and Technology* 22(5); 1987; 571-573

Simple, fast inexpensive and effective chromatographic system is described for isolating the major red beet pigments. BV

Onions

- 1317 Powar (VN), Singh (NI), Dev (DK), Kulkarni (DN) and Ingle (UN). Solar drying of white onion flakes. *Indian Food Packer* 42(1); 1988; 15-28

The suitability of various solar driers for drying of sliced white onions and the influence of sulphitation on colour retention by dried onion flakes were investigated. The drying rate was fastest in mechanical cabinet drier followed by matrix bed air heater, rock type air heater (both solar driers) and open air drying. Sulphitation with 0.25% potassium metabisulphite for 5 min. prevented pink discolouration of flakes dried in solar driers. Sulphited slices needed less time for drying than control samples in all types of solar driers. Retention of ascorbic acid was more in the sulphited samples retained slightly less ascorbic acid than the mechanically dried. Browning was less pronounced in sulphited samples than the corresponding controls. Increase in browning was observed in all the samples during storage but the sulphited samples exhibited somewhat less increase. The decline in ascorbic acid content during storage was more in the sulphited samples than in the controls. In sensory evaluation, the sulphited samples from various solar driers received the max. scores for colour, texture and overall acceptability. KAR

- 1318 Raina (BL), Teotia (MS), Pruthi (JS), Kalra (CL) and Jarnail Singh-Nandpuri (KS). Studies on the evaluation of some new onion cultivars for their suitability for dehydration. *Indian Food Packer* 42(1); 1988; 7-14

Six white onion var. (L-124, L-131, Punjab-48, L 257-9-1, L-106, UD-102), one yellow (Texas Yellow Grano) and one red (Punjab selection) were analysed for physicochemical characteristics and also assessed for dehydration. The flavour of all the var. varied from medium to strong. The total solids were high in Texas Yellow Grano (15.8%) followed by Punjab Selection (13.5%), UD-102 (13.5%), Pb-48 (13.4%). Among the white var., L-131 recorded max. pungency followed by L-257-9-1. The drying ratio in white var. ranged from 7.7:1 to 8.1:1 and the yield of dried product was highest in Punjab-48 and min. in L-106 and UD-102. Due to its high average yield/ha, less rotten %, high soluble solids content and good drying ratio, Pb-48 was found most suitable for dehydration followed by L-131 and L-124. VKR

Tubers

Patotoes

- 1319 O'Beirne (D) and Ballantyne (A). Some effects of modified-atmosphere packaging and vacuum packaging in combination with antioxidants on quality and storage life of chilled potato strips. *International Journal of Food Science and Technology* 22(5); 1987; 515-523

The modified atm. (3-4% carbon dioxide, 1-2% oxygen) packaging used in combination with dipping of potato strips in a 10% ascorbic acid solution, inhibited enzymatic discoloration for 1 wk at 5 C. Vacuum packaging within a surlyn/PVDC-coated polyester film, with or without dipping in ascorbic acid solution, inhibited discoloration of chilled potato strips stored at 5 C for at least 2 wk. BV

Potatoes

- 1320 Bohler (G), Escher (F), and Solms (J). Evaluation of cooking quality of potatoes using sensory and instrumental methods. 2. Instrumental evaluation. *Lebensmittel-Wissenschaft und-Technologie* 20(4); 1987; 207-216

Instrumental tests for assessing the cooking quality of potatoes were evaluated. Potato tubers of four Swiss var. at equal tuber wt. and strictly defined classes of sp. were used. Tuber break down or 'sloughing' is measured best by direct detn. of the cell material released during cooking. Classical sloughing tests and T-100 values proved to be inconclusive for the description of sloughing. Fracture of potato tissue is recorded with this system, indicating that consistency depends on the solid-like properties of cooked potatoes. 'Mealiness' is closely related to the values obtained with a penetration test using a conical cylinder. Cone penetration measures flow properties of liquid-like systems, indicating that mealiness is a viscosity related sensory attribute. Mealiness can also be described well by the amount of cell material released during cooking. The use of an integralshear test with a Kramer shear cell showed no advantage over the local penetration tests. Local penetration tests also permit a 'texture topography' to be recorded over large areas of individual potato tuber. It is advisable to use both sensory and instrumental

tests simultaneously in order to obtain a full picture of cooking quality of potatoes. BV

Potato crisp

- 1321 Gamble (MH) and Rice (P). Effect of pre-fry drying on oil uptake and distribution in potato crisp manufacture. *International Journal of Food Science and Technology* 22(5); 1987; 535-548

Microwave, hot air (40 and 105 °C) and freeze drying were used to remove varying amounts of moisture from 1.3 mm thick potato slices. The partially dried slices were then fried in oil at 165 °C. The microwave and hot air treatments resulted in a reduction in the final oil content, which was related to the degree of pre-fry drying. Freeze drying resulted in an increase in the oil content, again related to the initial moisture reduction. It is suggested that pre-fry drying may be a more successful point of influence than post-fry treatment in the manufacture of a lower fat crisp. BV

Potato starch

- 1322 Dluzewski (M), Dluzewski (P) and Gromadka (M). Effect of potato starch modification on starch granules image in the electron microscope. *Acta Alimentaria Polonica* 13(1); 1987; 23-31

An electron microscope was used to study the granules of native and modified potato starch. Acid modification caused lesions in the granules and revealed their internal structure. Granules modified by the phosphate method exhibited small modules on their surface, underwent aggregation and tended to stretch. AS

- 1323 Dluzewski (M), Lada (E), Latkowska (J), Waczkowski (W) and Zdanowicz (D). Effect of selected methods of modifying of potato, wheat and maize starches on their physico-chemical properties. *Acta Alimentaria Polonica* 13(1); 1987; 15-22

It was found that mild acid or enzymatic hydrolysis resulted in an increased temp. of starch pasting, a reduction of paste viscosity, and an increase of gel syneresis after defreezing. The physico-chemical changes brought about by phosphate modification were opposite to those induced by the acid and enzymatic modification. KAR

- 1324 Kuhn (K), Kruschak (W) and Lechert (H). Comparative NMR-investigation of the binding of water in starch and raw potatoes during the drying process. *Starch/Starke* 39(1); 1987; 1-5 (De).

A reversible swelling which is caused partly by reorientational motion of water is observed by heat-moisture treatment of native starch at 60 °C. This means that water can either only loosen the outer amylopectin layer or that it gets through to the inner part of a starch granule to become less loosely associated with amylose. The drying up of the outer layer of the material to be dried means a reduction of the self diffusion coeff. and a hindrance to the discharge of water. But apart from this another influence upon the

drying-speed is observed which is in direct connection with the behaviour of starch already mentioned above. Soon at the beginning it is to be noticed that the mobility of the water within the cell increases and that it gets transported into the middle of the potato. At a temp. of 50 C to 60 C the swelling of starch starts and water therefore becomes immobilized. To some extent some water becomes enclosed in existing structures where it remains relatively flexible. These processes can be followed by nuclear magnetic resonance (NMR-Spectroscopy). On this basis statements about different water molecules and their particular quantities can be made. The immobilisation of the water can be shown by the smaller water activity of the starch samples after the heat-moisture-treatment. Also it can be seen in the lowering of the drying speed. AS

Yams

- 1325 Mozie (O). The effect of 2, 4-D and other plant growth regulators on sprout formation in *Dioscorea rotundata* Poir. (white yams) in storage. *Tropical Science* 27(4); 1987; 229-232

Sprouting of tubers was significantly stimulated by IAA, NAA and IBA at 1-1000 mg/l concn. The stimulation of sprouting by these auxins increased with increase in concn. of each chemical. In tubers treated with 2, 4-D there was general inhibition of sprouting at all concn., but at the concn. range of 1-10 mg/l there was complete removal of inhibition to sprouting after 24 wk. Tubers treated with 100-1000 mg/l 2, 4-D continued in the dormant state after 52 wk of storage. KAR

Yam flour

- 1326 Akoroda (MO). Incorporating tuber peels in white yam flour. *Tropical Science* 27(4); 1987; 239-248

This paper proposes that waste of nutrients in the peels and the inadvertent loss of useful endoderm and storage cortex tissues through peeling can be avoided and that tuber peels can be incorporated in reconstitutible yam flour. Evidence of the generally non-toxic nature of peels is assembled and discussed. BV

Vegetables

- 1327 Wedzicha (BL). Chemistry of sulphur dioxide in vegetable dehydration. *International Journal of Food Science and Technology* 22(5); 1987; 433-450

The chemical basis of the preservative action of sulphur dioxide is discussed in terms of the nucleophilicity of the sulphite ion and the possible consequences of the changing state of the additive during dehydration. The significance of autooxidation of the sulphite ion to its fate in food, and role as an antioxidant, or prooxidant, is critically reviewed. The inhibition of non-enzymic browning and the current state of knowledge concerning non-enzymic browning is explained. Toxicological implications is also covered. 61 references.

BV

- 1328 Wills (RBH), Lim (JSK) and Greenfield (H). Composition of Australian foods. 39. Vegetable fruits. *Food Technology in Australia* 39(10); 1987; 488-491

Various types of bean, capsicum, chili, choko, cucumber, eggplant, marrow, okra, pea, pumpkin, squash, sweet corn and zucchini were analysed. Data are presented for water, protein, fat, sugars (glucose, fructose, sucrose), raffinose, stachyose, starch, dietary fibre, organic acids (malic, citric, oxalic, quinic, and tartaric acids), ash, vitamin C, thiamin, riboflavin, niacin, carotenoids (Alpha and Beta-carotenes and cryptoxanthin), potassium, sodium, calcium, magnesium, iron, zinc, edible weight and energy. AS

Leafy vegetables

Amaranthus

- 1329 Bressani (R), Elias (LG), Gonzalez (JM) and Gomez-Brenes (R). The chemical composition and protein quality of amaranth grain germ plasm in Guatemala. *Archivos Latinoamericanos de Nutricion* 37(2); 1987; 364-377

Cabbages

- 1330 Fleming (HP), McFeeters (RF) and Humphries EG). A fermentor for study of sauerkraut fermentation. *Biotechnology and Bioengineering* 31(3); 1988; 189-197

The fermentation of shredded cabbage to produce sauerkraut (Kraut) is an important means of preservation and production of unique flavours with low energy requirements for storage and processing. Consumers in USA prefer mild acidic flavour of sauerkraut. In order to achieve this a fermenter was designed and constructed for study of the physical, microbiological and chemical changes that occur during sauerkraut fermentation. The fermenter has some essential features that include restriction in volume of the sauerkraut bed. Construction of clear plastic to permit visual detn. of liquid-level changes and a gas lift device for nitrogen purging into fermenting brine. GAR

Spinach

- 1331 Gonzalez (AR), Davis (DR), Kattan (AA), Elkins (ER) and Kim (ES). Effect of field and washing treatments on ethylenethiourea levels in ethylenebisdithiocarbamate-treated canned spinach. *Journal of Food Safety* 8(4); 1987; 225-233

In this paper the effects of field application rates, number of applications, number of application interval to harvest after field treatment with EBDC (Ethylenebisidithio carbamate) fungicide and the effect of washing on the levels of the residue ETU (ethylene thiourea) in spinach have been studied. The results showed that high rates of EBDC, high number of field applications and applications closer to

harvest time increased ETU levels in canned spinach and washing with water before processing significantly reduced the ETU levels in spinach from all the field treatments but washing with NaOH solution and a mild detergent reduced even further the ETU levels. NGKR

Okra

- 1332 Ramadas Bhat (U) and Tharanathan (RN). Functional properties of okra (*Hibiscus esculentus*) mucilage. *Starch/Starke* 39(5); 1987; 165-167

From immature okra pods a mucilage was isolated. The native mucilage, although not soluble in water and various salt solutions, was easily solubilized (~80%) in aqueous sodium borohydride solution (1%). The viscosity of the borohydride-soluble fraction was max. at a pH range of 4-6, it exhibited a pseudoplastic behaviour and its viscosity decreased on adding water soluble additives. However, with maltodextrin an increase in viscosity was noticed, which may be the result of hydrogen bonding interactions. The fraction exhibited foam stabilizing and gelling properties, and a "strengthening effect" on soft wheat dough, as shown by farinography and extensograph experiments. AS

Plantains

- 1333 Asiedu (JJ). Physicochemical changes in plantain (*Musa paradisiaca*) during ripening and the effect of degree of ripeness on drying. *Tropical Science* 27(4); 1987; 249-260

Plantains (hanging bunches and detached fingers) were stored under chosen storage conditions (temp. of 28 C. 82% relative humidity) for 19 days and the physicochemical changes accompanying the ripening process were studied. During ripening there was an increase in total sugars with corresponding decline in starch. The first visible sign of ripening was observed within 2 days under the chosen storage condition. On the basis of the colour of the peel and consistency of the flesh, five stages of ripeness were identified and classified, which may serve as 'time' criteria for processing ripe plantain. Over 10% dry matter loss was determined at the end of the ripening test. Flesh to peel ratio in the green unripe fruit was 1.22-1.68, and it increased to 2.3-2.6 at advanced measure of maturity and ripeness. Unripe and ripe plantain, in 15 mm cubes, were oven-dried at temp. of 50, 70/85, and 100 C to determine their drying characteristics and the effect of stage of ripeness on the drying rate and equilibrium moisture content. The most suitable temp. range for drying both unripe and ripe plantain was between 50 and 70 C. KAR

FRUITS

- 1334 Bushway (RJ). Rebuttal on quantification of major carotenoids in raw fruits and vegetables by HPLC. *Journal of Agricultural and Food Chemistry* 35(5); 1987; 849-850

- 1335 Kantha (SS). Comments on quantification of major carotenoids in raw fruits and vegetables by HPLC. *Journal of Agricultural and Food Chemistry* 35(5); 1987; 849

This review pertains to the comments on the observation of Khachik et al that the degradation, rearrangement and stereoisomerization of carotenoids are influenced by the degree, length and the method of cooking of raw fruits and vegetables. Experiments are indicated to understand the effect of heat treatment on the pro-vitamin A carotenoids of edible plant products. NGKR

- 1336 Khachik (F) and Beecher (GR). Rebuttal on quantification of major carotenoids in raw fruits and vegetables by HPLC. *Journal of Agricultural and Food Chemistry* 35(5); 1987; 850

Bananas

- 1337 Chiang (BH), Chu (WC) and Chu (CL). A pilot scale study for banana starch production. *Starch/Starke* 39(1); 1987; 5-8

Immersing the green banana in hot water at 70 °C for 5 to 6 min could facilitate the peeling process. Low temp. milling decreased viscosity of the resulting starch suspension. Addition of 0.5 N, NaOH solution during milling, and leaving the milled banana paste overnight before screening could improve the efficiency of starch extraction. Remilling the pomace of 1st screening step could increase yield. The studied process procedure resulted a yield for banana starch of 70 %. The purity of the product was approx. 94%. BV

- 1338 Macku (C) and Jennings (WG). Production of volatiles by ripening bananas. *Journal of Agricultural and Food Chemistry* 35(5); 1987; 845-848

This investigation is to determine the relative amounts of the main volatiles of ripening of bananas by a method that minimises samples alteration and maximises analytical efficiency. This was followed by GLC analysis of dynamic headspace injections and the detn. of peak areas of 17 compounds consisting of 6 acetate esters, 5 butyrate esters, 4 alcohols, 1 ketone and 1 isovalerate ester relative to that of an internal standard. It was observed that in general the amounts of individual volatiles increased continuously to the onset of peel browning after which they either plateaued or decreased. A linear correlation was found between the total acetate esters/ total butyrate esters ratio and ripening time. Discrepancies showed that the method affects the results of volatiles isolation and their analysis. NGKR

Custard apples

- 1339 Wyllie (SG), Cook (D), Brophy (JJ) and Richter (KM). Volatile flavour components of *Annona atemoya* (custard apple). *Journal of Agricultural and Food Chemistry* 35(5); 1987; 768-770

In this investigation one of the two var. grown commercially in Australia viz *Annona atemoya* cv. African Pride Fresh custard apple was

studied for the volatiles by separation using simultaneous steam distillation-solvent extraction and analysis by capillary GLC/MS. The results of analysis showed mono or sesquiterpenes with Alpha-and Beta-pinene, germacrene D, and bicyclogermacrene constituting major components. During ripening no characteristic change in the volatile compounds was observed. NGKR

Kiwifruits

- 1340 Ogura (N), Kumakawa (K), Fukushima (M), Soda (I), Sato (T) and Nakagawa (H). Studies on peroxidase of kiwifruit. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi)' 35(1); 1988; 1-6 (Ja).

The greater part of peroxidase was distributed in core of kiwifruit and was extracted by Tris-HCl buffer (pH 8.0) containing 5% NaCl. The amount of extractable peroxidase activity was decreased during fruit ripening. Polyacrylamide gel electrophoretic analysis showed that the three peroxidase isozymes were contained in core of kiwifruit and the zymogram pattern of isozyme was not changed during fruit ripening. Zymogram of partially purified peroxidase on polyacrylamide gel showed one active band. This enzyme preparation had a pH optimum of 7.5 K_m value for pyrogallol of 10 mM, and was strongly inhibited by KCN. BHS

Litchi

- 1341 Ghosh (B), Biswas (B), Mitra (SK) and Bose (TK). Physico-chemical composition of some promising cultivars of litchi adapted in West Bengal. *Indian Food Packer* 42(1); 1988; 34-37

Twelve cv. (Bedana, Bombai, Deshi, Early large red, Elachi, Kasba, Mclean, Muzaffarpur, Muzaffarpur Early, Nagarpal, Purabi and Rose Scented) of litchi (*Litchi chinensis* Sonn.) based on the fruit wt., were analysed for physical (fruit wt., pulp wt., peel wt., length/diameter) and chemical composition (soluble solids, sugar, acidity and ascorbic acid). In size and quality cv. Bedana was superior and Bombai, Muzaffarpur, and Early Large Red were superior in wt. and pulp %. Kasba and Mclean were poor in wt. and quality. Cv. Bedana, Bombai and Elachi found superior for canning based on the sugar/acid ratio. VKR

- 1342 Shashi Prabha Jain, Tripathi (VK), Ram (HB) and Surjeet Singh). Varietal suitability of litchi for squash making. *Indian Food Packer* 42(1); 1988; 29-33

Quality (chemical composition) and discolouration characteristics of juice were determined in four litchi var. (Desi, Calcuttia, Rose scented and Late Bedana). Overall acceptability was higher for the squash prepared from Calcuttia var. followed by Desi, Rose Scented and Bedana. Squash from Calcuttia var. retained its natural colour, aroma and taste during the 9 month storage whereas the Bedana squash developed pink discolouration in 3 months storage. It was observed that the soluble solids content, sugars and browning progressively

increased during storage studies and the ascorbic acid and tannin contents decreased in all the four var. Overall acceptability was significantly higher for Calcuttia var. followed by Desi var. VKR

Mangoes

- 1343 Godoy (HT) and Rodriguez-Amaya (DB). Changes in individual carotenoids on processing and storage of mango (*Mangifera indica*) slices and puree. *International Journal of Food Science and Technology* 22(5); 1987; 451-460

The carotenoid composition was practically maintained on processing mango (cv Tommy Atkins) slices. The only significant change was the increase in luteoxanthin, compatible with the conversion of 5, 6 to 5, 8 - epoxide. More evident transformations occurred on processing mango (Golden) puree. The major pigment Beta-carotene decreased 13%, resulting in a corresponding reduction of the vitamin A value. Auroxanthin, not found in the fresh fruit, appeared while violaxanthin and luteoxanthin decreased. During storage of mango slices in lacquered (epoxy) or plain tin-plate cans no appreciable loss of Beta-carotene was observed during 10 months. Between the tenth and fourteenth month, about 50% reduction of Beta-carotene occurred. The degradation continued, resulting in a total loss of 84% after 24 months. Beta-carotene showed a greater susceptibility to degrade in bottled mango puree (18% loss after 10 months) than in the canned product. As in the case of mango slices, however, both bottled and canned puree suffered 50% loss of Beta carotene after the tenth month, and a total loss of 83% after 24 months. Violaxanthin and luteoxanthin tended to decrease while auroxanthin maintained a comparatively high level throughout storage. The vitamin A values reflected the degradation trend of Beta-carotene, a pattern that appears to agree with a free radical mechanism. KAR

Pears

- 1344 Tuszyński (T). Chemical and sensory assessment of fermented pear distillates. *Acta Alimentaria Polonica* 13(1); 1987; 57-66

The physico-chemical and sensory characteristics of distillates of fermented mashes from "Bera Williams" pears were investigated. It was found that the distillates with untypical sensory characteristics contain a particularly high amount of hexyl alcohol, fusel alcohols and that they have a less varied qualitative and quantitative composition of esters and fatty acids. AS

Pineapples

- 1345 Joseph (G) and Mahadeviah (M). Utilisation of waste from pineapple processing industry. *Indian Food Packer* 42(1); 1988; 46-58

Production of bromelain, wine, sugar syrup, citric acid, waxes and sterols and cattle feed from the mill juice of pineapple processing industry waste has been indicated. Pineapple oleoresin, pineapple syrup, hemicellulose-B and cellulose are other products that could be

produced. Vinegar and starch could also be produced from pineapple waste whereas the fibre could be used for fabric, and paper manufacture. Some latest products are single cell protein, biogas, oxalic acid, Alpha-mannosidase, gum, sucrose and molasses. KAR

- 1346 Maurya (KR). Predicting maturity of pineapple var. -Kew. Indian Food Packer 42(1); 1988; 43-45

Maturity of Kew pineapple (*Ananas sativus* Merr.) in Assam agro climatic conditions has been studied by analysing the chemical composition of fruits at regular intervals from 15 days to 141 days after inflorescence. The soluble solids content and the sugar content was max. at 135 days after inflorescence whereas the acidity increased upto 133 days and constant thereafter. From these observations it is concluded that the period between 133 and 135 days after inflorescence emergence is the optimum time for harvest. VKR

Zizyphus spina-christi

- 1347 Nour (AAAM), Ali (AO) and Ahmed (A-H). A chemical study of *Zizyphus spina-christi* (Nabag) fruits grown. Tropical Science 27(4); 1987; 271-273

Results of the chemical analysis of *Zizyphus spina-christi* (Nabag) showed that mesocarp of the fruit is rich in sugars (glucose and sucrose) oleic and linoleic acids dominate the fatty acid composition of the seed oil. The seed proteins are rich in sulphur-containing amino acids (5.8 g/16 g N) and threonine (4.0 g/16 gN), and they contain a reasonable amount of lysine (4.0 g/ 16 gN). BV

CONFECTIONERY, STARCH AND SUGAR

Confectionery

- 1348 McMaster (TJ), Smith (AC) and Richmond (P). Physical and rheological characterisation of a confectionery product. Journal of Texture Studies 18(4); 1987; 319-334

The mechanical and rheological properties of caramel have been measured in the context of a continuous extrusion forming operation including a repetition of the processing route. Using the scanning electron microscope the sensitivity of mechanical testing of samples to processing is borne out by the changes in microstructure which also affect the velocity of transmitted ultrasound. It was also seen that the effect of repeated processing is also greater at a lower processing temp. NGKR

- 1349 Sweetmaker. The manufacture of sugar confectionery. Selection of nut and cream pastes. Confectionery Production 54(2); 1988; 118-120

Concluding article on the manufacturing of nut and cream pastes.

Recipes and methods of production of paste lozenges and compressed lozenges are described. Faults and remedies in the production of compressed tablets are briefly described. SYR

Cocoa

- 1350 Altug (T) and Gonul (M). The detection of soybean flour in cocoa powder. *Journal of Food Quality* 10(5); 1987; 295-298

The evaluation of protein for determining the presence and content of soybean flour has been carried out in this investigation as it is used as an adulterant. The results showed that the coeff. of detn. were found to be significant for estimating the adulteration level. For quantitative measurement of soybean flour in cocoa powder a protein scale has been developed by this investigation. NGKR

Marshmallows

- 1351 Schalinatus (E), Behnke (U) and Zaulig (Ch). On taste deviations by saponification of the fat glaze on chocolate-coated marsh mallows. *Nahrung* 31(9); 1987; 917-918

Starch

- 1352 Eliasson (AC), Larsson (K), Andersson (S), Hyde (ST), Nesper (R) and Von Schnering (HG). On the structure of native starch-analogue to the quartz structure. *Starch/Starke* 39(5); 1987; 147-152

The branching geometry of amylopectin, according to chemical degradation studies has been combined with the knowledge of packing arrangement of double helices. The structural organization of the polyglucan chains in the crystalline amylopectin units can be described by an infinite periodic minimal surface, and it is closely related to the structure of high-quartz with space group $P6_4$ 22. An important feature of the molecular packing is that the van der Waals distance between double helices is very similar to the length of a linkage formed by the Alpha-1,6-glucoside branching. The physical properties of starch are finally discussed in relation to the proposed structure. AS

- 1353 Mandenius (CF), Nilsson (B), Persson (I) and Tjerneld (F). Kinetic models for enzymic cellulose degradation in aqueous two-phase systems. *Biotechnology and Bioengineering* 31(3); 1988; 203-207

Cellulose materials can readily be degraded into cellobiose and glucose by hydrolysis of the enzymes cellulase and Beta-glucosidase in aqueous media. Product inhibition does, however, retard the reaction rate and reduce productivity. This may be avoided by carrying out the degradation of cellulose in an aqueous two-phase system, which permits the enzymes and the substrate to be partitioned to one phase and the products to be extracted into a second phase. In addition, two-phase systems also allow recycling of the enzymes. Here, three models previously developed for "one phase" enzymic degradation are compared to data from enzymic degradation in an aqueous two-phase system. The

models tested agreed relatively well with batch experiments during a period of 200 h. For one of the models tested, continuous degradation also gave accurate agreement. AS

- 1354 Smolnik (H-D). Production and application of caramel colour from starch products. *Starch/Starke* 39(1); 1987; 28-32 (De).

Process for the production of caramel from sugars, and different types of caramels are discussed. KAR

Sugar

- 1355 de Bruijn (JM), Kieboom (APG) and van Bakkum (H). Alkaline degradation of monosaccharides. Part VII. A mechanistic picture. *Starch/Starke* 39(1); 1987; 23-28

Recent data on the alkaline degradation of monosaccharides have been used to develop a mechanistic picture of the alkaline degradation of monosaccharides. It appears that the degradation of monosaccharides themselves, particularly ketoses, is directed by the reaction condition. So, the extent of retro-aldolization of ketoses largely determines the amount of lactic acid formed whereas the benzilic acid rearrangement/Alpha-dicarbonyl cleavage/ aldolization ratio of Alpha-dicarbonyls further influences the composition of the C₁ -C₁₆ acid part of products as well as the total amount of oligomeric products. AS

BAKERY PRODUCTS

Bread

- 1356 Figuerola (FER), Ana Maria Estevez (A) and Elena Castillo (V). Supplementation of wheat flour with chickpea flour. I. Preparation of flours and their breadmaking properties. *Archivos Latinoamericanos de Nutricion* 37(2); 1987; 378-387

The feasibility of adding chickpea flour substituting part of wheat flour in yeast-leavened breadmaking to increase the protein value, was studied. Wheat flours of 74% and 78% extraction were blended with 5% 10% and 15% of chickpea flour. Addition of chickpea flour increased protein, fiber, ash and fat content in the blends, without any effect on quality, even at the 15% level of substitution. Blends showed an increase in maltose content, W value and bread specific volume. Breads prepared were of good quality even without the use of maturing agents. BV

- 1357 Higo (A) and Noguchi (S). Process of bread hardening by microwave-heating. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi)' 34(12); 1987; 781-787 (Ja).

The relationship between the process of bread hardening and bread staling, the behaviour of bound water and the retrogradation of

gelatinized starch in microwave heated bread were investigated. Microwave heating increased the bound water of bread in accordance with the rapid hardening, and also the starch gel in bread, but the gel was unstable because of the remarkable decrease in the extractability during storage. The digestibility and X-ray diffraction showed that the process of hardening was different from that of bread staling. BV

- 1358 Shinholser (K), Hellemann (U), Salovaara (H), Ellila (M) and Powers (JJ). Factor patterns yielded by subsets of panelists examining Finnish sour rye bread. *Journal of Sensory Studies* 2(3); 1987; 199-213

Dough

- 1359 Bartnik (M), Jakubczyk (T) and Wrzeciono (A). Phytase activity in fermentative microflora of dough. *Acta Alimentaria Polonica* 13(1); 1987; 67-73

It was found that phytase is present in *Saccharomyces cerevisiae* and *Saccharomyces minor*, and absent in lactic acid bacteria cells. The activity values suggest that the yeast phytase is of slight practical significance since it is capable of decomposing less than 5% of the total phytates in flour. KAR

MILK AND DAIRY PRODUCTS

Milk

- 1360 Alichanidis (E). Partial purification and characterization of an extracellular proteinase from *Aeromonas hydrophila* strain A 4. *Journal of Dairy Research* 55(1); 1988; 97-107

An extracellular metalloproteinase from *Aeromonas hydrophila* strain A4, isolated from milk, was purified by a factor of 300 by chromatography on DEAE cellulose and Sephadex G-150. The enzyme had a mol. wt of 43000 and contained 2 g atom Ca/mol. It was active over a pH range 4.8-9.5 and had optimum activity on casein at pH 7.0 with $K_m = 0.17$ mM. It was strongly inactivated by metal chelators and the apoenzyme was fully reactivated with Ca^{2+} , Mn^{2+} or Co^{2+} . Heavy metal ions such as Ag^{2+} , Hg^{2+} , Fe^{2+} , Zn^{2+} , Cd^{2+} , Ni^{2+} , and Cu^{2+} totally or partly inactivated the enzymic activity at 5 mM concn. The enzyme was not inactivated by diisopropylfluorophosphate, soybean trypsin inhibitor or sulphhydryl group reagents. It was optimally active at 45 °C; above 50 °C activity declined, rapidly, but significant activity persisted at 4 °C. It was heat labile in phosphate or Tris-maleate buffer but exogenous Ca^{2+} afforded protection. AS

- 1361 Chase (LE), Eckerlin (RH), Ebel (JGJr), Maylin (GA), Gutenmann (WH) and Lisk (DJ). Residues of p, p'-DDE and dicofol in milk of dairy cows fed commercially produced apple pomace. *Journal of Food Safety* 8(4); 1987; 245-253

This paper the apple pomace produced from orchards that had been treated with various pesticides was tested for these residues and the report was presented. The residues of the miticide, dicofol, p,p' - DDE, a metabolite of p, p' - DDT present as an impurity in dicofol have been found in each commercial apple pomace sampled in various locations of New York. Traces of these residues have also been found in milk of cows fed with these pomaces for 9 days and also in milk obtained from a dairy. However the milk residues were found to be low to be of any health significance to consumers. NGKR

- 1362 Essick (LA) and Lisk (DJ). Selenium in milk of dairy cows fed the newly legalized 0.3 p.p.m. selenium-supplemented diet. *Journal of Food Safety* 8(4); 1987; 255-259

The selenium concn. which is permissible legally in dairy cattle rations has been recently increased from 0.1 to 0.3 p.p.m.. The feeding experiments with lactating dairy cows having 0.3 or 0.6 p.p.m. selenium as sodium selenite in the diets for 23 or 26 days showed that no consistent increase in the concn. of selenium in milk and blood throughout the period was observed. NGKR

- 1363 Garg (SK) and Garg (P). Incidence of off-flavours in milk. *Indian Dairyman* 39(10); 1987; 481, 484-488

Various types of off-flavours that may occur in milk are reviewed under the following headings: transmitted flavours; microbial flavours; lipolytic flavours; flavours associated with heat treatment; light-activated flavours; oxidised flavours; and some miscellaneous flavours. The off-flavours in ultra high temp. milk has also been covered. MVG

- 1364 Kikuchi (E), Kobayashi (H), Shibuya (H), Kusakabe (I) and Murakami (K). Preparation of milk-clotting enzyme from basidiomycete. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi)' 35(1); 1988; 48-51 (Ja).

In the selection of rennet substitutes, it is well known that the ratio of milk-clotting activity to proteolytic activity (MCA/PA) is an important index and higher MCA/PA ratio is desirable. Thus, a simple preparation method was investigated for the elimination of proteinase having high proteolytic activity from the rennet-like enzyme of *Lrpexlacteus*. At the treatment of pH 6.5, 35 °C for 20 min. the proteinase other than the milk-clotting enzyme was inactivated almost completely and the MCA/PA ratio increased approx. 1.8-fold over that of the crude preparation. This value closely equaled that of the milk-clotting enzyme of *Lrpexlacteus*, purified by an affinity chromatography. It is concluded that this advantageous treatment can be easily applied commercially for cheese manufacture, because it is very simple and cheap. AS

- 1365 Korolezuk (J) and Maubois (J-L). Effect of pH, calcium concentration and temperature on the evolution of the refractometric signal produced during rennet coagulation of milk. *Journal of Dairy Research* 55(1); 1988; 81-88

An Industrial refractometer connected to a microcomputer was used to study the rennet coagulation of milk. The amplitude of the refractometers signal changes during coagulation was about 10^{+4} times more important than the resolution of the computerized refractometer. The signal v time derivatives were calculated and the inflection point time (t_i) was correlated with pH, Ca concn. and temp. The infection point time was inversely proportional to the rennet and Ca concn. and the logarithm of the proportionality factor (K) was linearly correlated with pH. The relation between t_i and temp. was curvilinear. The refractometer tested could be applied as a research probe and eventually be used to determine coagulation during cheese making and any other coagulation process. MCV

- 1366 Mckinnon (CH), Bramley (AJ) and Morant (SV). An inline sampling technique to measure the bacterial contamination of milk during milking. *Journal of Dairy Research* 55(1); 1988; 33-40

The development of devices to sample milk at the clawpiece (CILM) and end of the pipeline (PILM) during milking were described. The bacteriological (total bacterial count, coliform count and count of *Streptococcus agalactiae*) and compositional (butterfat percent) quality of milk collected from the sampling devices or from the recorder for or milk cans were similar, demonstrating that the samples provided accurate and representative values. The use of in-line milk (ILM) sampling techniques when used in combination with selective media, make possible a direct assessment of the major sources of contamination of the bulk tank milk. The bacterial count of the milk sample drawn at CILM represents the contamination from mastitis infection and the surface of the teats. The milk sample drawn from PILM, will in addition include the bacteria removed by the milk in its passage through the milking machine. It would be advantageous to combine the ILM technique with a modified Direct Epifluorescent Filter Technique (DEFT) thereby eliminating the incubation of bacterial cultures and a reduction in time taken to enumerate bacteria in milk. MCV

- 1367 Needs (EC), Anderson (M) and Kirby (S). Influence of somatic cell count on the whipping properties of cream. *Journal of Dairy Research* 55(1); 1988; 89-95

Cows were infused with *Escherichia coli* endotoxin to provide a poor or milks with high somatic cell counts (SCC). This was mixed with bulk tank milk obtained from either of two Institute herds, producing a range of milks containing 0, 10, 20, 30 and 100% high SCC (HCC) milk. Creams containing 38% fat were produced from these milks on nine separate occasions; five times from winter milks and four times from summer milks. Whipping time and stiffness increased and overrun (vol. increase) decreased as the proportion of HCC milk in the mixture increased. However, these changes were statistically significant only when comparing the 100% HCC milk with the other treatments containing lower levels of HCC milk. Creams produced in the summer took less time to whip and were less stiff than winter creams but there was no change in overrun. MCV

- 1368 Ng-Kwai-Hang (KF), Moxley (JE) and Marziali (AS). Gross composition of milk and cheddar cheese yields in some Quebec cheese factories. Canadian Institute of Food Science and Technology Journal 20(5); 1987; 372-377
- 1369 Van Boekel (MAJS) and Zia-ur-Rehman. Determination of hydroxymethylfurfural in heated milk by high performance liquid chromatography. Netherlands Milk and Dairy Journal 41(4); 1987; 297-306

In this paper a UV absorption method for the detn. of 5-(hydroxymethyl)-2-furfural (HMF) in heated milk by HPLC has been described. This method is different from the colorimetric method in which HMF released by treating milk sample with 0.3 N oxalic acid at 100 C for 1 and colour is developed with thiobarbituric acid and estimated colorimetrically. The colorimetric method is disadvantageous as it is not specific and colour is also produced in raw unheated milk. But HPLC method is specific due to the strong UV absorption of HMF at 280 nm and its release at 100 C appeared to be faster with 6N acetic acid than with 0.3 N oxalic acid. However, the heating time is restricted to 15 min. with 6N acetic acid and 25 min with 0.3 N oxalic acid. The recovery (95%) the repeatability (Coeff. of variation 3.5%) and the limit of detection (70.5 μ mol./L milk) of this method proposed are satisfactory and the UV method is a better indicator for the extent of heat treatment of the milk than the colorimetric method. NGKR

- 1370 Van der Stege (HJ) and Walstra (P). Vacuole formation during spray drying of milk. The use of a sealed atomizing disk. Netherlands Milk and Dairy Journal 41(4); 1987; 321-328

In this paper the results obtained with a sealed desk atomizer with the aim of producing milk powders with a very low vacuole content have been presented. By using this disk very low vacuole contents (about 5 ml/100 g powder) could be obtained only if the viscosity of the feed liquid was very high. From the results obtained it was seen that even in a sealed disk considerable entrapment of air bubbles may occur during droplet formation depending mostly on atomizing conditions and also escape of entrapped air bubbles in newly formed droplets may also occur. NGKR

Cows Milk

- 1371 Emanuelson (U), Olsson (T), Mattila (T), Astrom (G) and Halmberg (O). Effects of parity and stage of lactation on adenosine triphosphate, somatic cell count and antitrypsin content in cows' milk. Journal of Dairy Research 55(1); 1988; 49-55

Significant effects of parity and stage of lactation were found on ATP content, somatic cell count and antitrypsin content when using morning milk samples from 39 cows over a period of 18 months. A close similarity was evident between variation in ATP and somatic cell count, except during the first 10 days, after parturition when the variation in ATP was more pronounced. The same result was obtained in the whole material as well as in a healthy subset. ATP analysis has

attracted increased interest as an instrument for detecting mastitis and for monitoring biological process in general. The study shows clearly that parity and stage of lactation must be taken into account when establishing normal values for ATP as an indicator of mastitis. MCV

Milk products

- 1372 Batish (VK), Sunita Grover and Yadav (JS). Microbiological quality control of dairy products. Part I. Role of National and International agencies. *Indian Dairyman* 39(10); 1987; 499-506

The role of microbiological criteria and its application along with the current status of microbiological standards has been briefly outlined. The aspects to be considered in establishing microbiological criteria at National and International level have been listed and the National and International agencies which can do this have been indicated. KAR

Cheese

- 1373 Hefnawy (SA). Modified rapid Gerber method for determination of oils in soft filled cheese. *Journal of Dairy Research* 55(1); 1988; 113-115

The fat content in cheese is normally estimated by the Gerber method. Oils in soft filled cheese are estimated by gravimetric methods such as Soxhlet which is accurate but takes 10 h. A modified Gerber method is described which requires only 20 min for the detn. of oils. The use of different solvents for the Gerber method gives a rapid and efficient procedure for the detn. of different oils in filled cheese. MCV

- 1374 Joosten (HMLJ). Conditions allowing the formation of biogenic amines in cheese. 3. Factors influencing the amounts formed. *Netherlands Milk and Dairy Journal* 41(4); 1987; 329-357

- 1375 Kikuchi (E), Hori (T), Sogo (Y), Kobayashi (H), Kusakabe (J) and Murakami (K). The effect of maturing on the texture of fiber-structured cheese. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi') 35(1); 1988; 33-49

Fresh cheese curds partly melted and stretched at 52 °C were subjected to chilled water to manufacture fiber structured, so-called "string" cheese which is now available in the market. Both compression and yielding tests by using a spherical indenter and sensory evaluation applied to these cheese samples during ripening for 9 wk at 10 °C indicated that the modulus of Deformability is of great value in predicting consumer's acceptability to cheese texture. GB

Cabrales cheese

- 1376 Alonso (L), Juarez (M), Ramos (M) and Martin-Alvarez (PJ). Effects of changes during ripening and frozen storage on the physicochemical and sensory characteristics of Cabrales cheeses. *International Journal of*

Food Science and Technology 22(5); 1987; 525-534

Frozen storage of Cabrales cheese prior to conventional ripening did not result in significant changes in the overall composition and fat characteristics. The extent of proteolysis was slightly lower in the cheeses frozen prior to ripening. BV

Cheddar cheese

- 1377 Kanawjia (SK) and Singh (S). Beta-Galactosidase-a biotechnological approach for Cheddar cheese production. *Indian Dairyman* 39(10); 1987; 467-470

One of the principal cost factors in the manufacture of Cheddar cheese is the time required for ageing the product. The addition of Beta-galactosidase to milk for cheese appeared to accelerate Cheddar cheese ripening but the basis of its action was not clear. Some aspects like the effect of Beta-galactosidase on the manufacture of cheese especially in the ripening behaviour and sensory quality have been reviewed. KAR

Gouda cheese

- 1378 Exterkate (FA), de Veer (GJCM) and Stadhouders (J). Acceleration of the ripening process of Gouda cheese by using heat-treated mixed-strain starter cells. *Netherlands Milk and Dairy Journal* 41(4); 1987; 307-320
- 1379 Goh (HC) and Sherman (P). Influence of surface friction on the stress relaxation of Gouda Cheese. *Journal of Texture Studies* 18(4); 1987; 389-404

Curd

- 1380 Hori (T). In-line objective measurement of the process of milk curd formation by the hot wire method. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi)' 35(1); 1988; 52-56 (Ja).
- 1381 Shah (CM) and Shah (BP). Dewatering of casein curd-a review. *Indian Dairyman* 39(10); 1987; 471-475

The review covers the principle involved in dewatering, methods of dewatering using roller press, screw press and Westfalia decanter centrifuge, and the physical characteristics of the dewatered curd of which the important aspect is plasticisation. KAR

Desserts

- 1382 Daget (N), Joerg (M) and Bourne (M). Creamy perception. I. In model dessert creams. *Journal of Texture Studies* 18(4); 1987; 367-388

In this investigation the sensory characteristics of model caramel creams containing four levels of dairy fat and nine levels

than gum as thickener were tested and viscometric measurements were carried out. The results were correlated with rheological parameters viz viscosity and flow behaviour index. There is found to be quadratic relationship between rheological parameters and both perceived creaminess and liking does not coincide with that for max. creaminess and depends on fat and gum content. The necessity of modalities of changes in optimal values for various groups of people have been indicated. NGKR

Kharwas

- 1383 Pushpa (RK) and Naina (VP). Buffalo colostrum gels. *Journal of Dairy Research* 55(1); 1988; 117-120

The gelling property of colostrum has been traditionally used in Western India, especially in the State of Maharashtra, to prepare a popular sweet dessert called Kharwas. Samples of colostrum from a single herd of Mehasana buffaloes were used to prepare gels. The gel strength was found to increase with increase in temp. upto 97 C. Similarly, an increase in gel strength was obtained with increase in time of heating at 100 C. Addition of 8% cane sugar or 12.5% brown sugar added to impart sufficient sweetness had no effect on gel strength. As the amount of water replacing the colostrum increased from 20 to 80% the gel strength decreased from 3.2 to as low as 0.04. With milk as replacer to the same level, the gel strength dropped from 3.4 to 1.33. MCV

Milk powders

- 1384 Renner (E). Storage stability and some nutritional aspects of milk powders and ultra high temperature products at high ambient temperatures. *Journal of Dairy Research* 55(1); 1988; 125-142

Many reactions which occur in milk powder as well as in UHT milk are temp. dependent. The shelf life, storage stability, flavour quality and nutritional value are impaired when these products are stored at high temp. over a long period. Besides, the penetration of moisture during storage of milk powder is to be avoided, as microbial growth and activity do not occur at a low water activity (< 0.7). This review discusses the biochemical reactions and nutritional aspects of milk powders as well as proteolytic and lipolytic activities of UHT products when stored at high ambient temp. Also covers aspects of maillard reaction, flavour quality and nutrition. MCV

Yoghurts

- 1385 Ranganadham (M) and Gupta (SK). Sensory evaluation of dahi and yoghurt. *Indian Dairyman* 39(10); 1987; 493-497

Desirable characteristics in dahi (Indian product of yoghurt) are outlined and the sequence of observation has been listed. The common defects observed in dahi have been summarised. Emphasize is placed on the body and texture and the need for training the panelists to identify specific defects have been described. Similarly the sen-

sory test for yoghurt has also been described. KAR

Milk proteins

- 1386 O'Neill (TE) and Kinsella (JE). Binding of alkanone flavours to Beta lactoglobulin: Effects of conformational and chemical modification. *Journal of Agricultural and Food Chemistry* 35(5); 1987; 770-774

Casein

- 1387 Hague (Z) and Kinsella (JE). Interaction between heated k-casein and Beta-lactoglobulin: Predominance of hydrophobic interactions in the initial stages of complex formation. *Journal of Dairy Research* 55(1); 1988; 67-80

Mixtures of k-casein and Beta-lactoglobulin (Beta- lg) were heated at 70 °C in 20 mM-imidazole buffer, pH 6.8 containing 20 mM-EGTA. Aggregation of the k-casein/ Beta-lg mixture occurred within 90 s and susceptibility to hydrolysis by chymosin decreased significantly within 180 s even though covalent interaction was not detected until after 4000 s. UV-absorbance indicated initial structural destabilization of the heated k-casein/ Beta-lg mixture followed by a return (> 350 S) to a spectrum comparable to the native state, indicating molecular rearrangement. Apparent hydrophobicity of k-casein decreased 80% within 250s compared to a 38% decrease for Beta-lg. The tendency of heated and subsequently cooled k-casein/ Beta-lg to aggregate reached a max. after heating at 70 °C for 720 S. MVC

MEAT AND POULTRY

Meat

- 1388 Ashoor (SH), Monte (WC) and Stiles (PG). Liquid chromatographic identification of meats. *Journal of the Association of Official Analytical Chemists* 71(2); 1988; 397-403

Raw beef, pork, veal, lamb, chicken, turkey, and duck have been identified with a liquid chromatographic (LC) method. Meat samples are blended in water, and soluble proteins in the aqueous blends are separated by the LC method. Meat cuts and parts from same species had similar chromatographic profiles and differed only quantitatively. However, meat cuts or parts from different species resulted in different chromatographic profiles. The qualitative and quantitative chromatographic differences among meat species were used for their identification. The LC method applies only to fresh and frozen meats. It is simple, rapid, and reliable, and can be used for quantitative detection of meat species in unheated meat blends. AS

- 1389 Berger (RG), Mageau (RP), Schwab (B) and Johnston (RW). Detection of poultry and pork in cooked and canned meat foods by enzyme-linked immunosorbent assays. *Journal of the Association of Official Analytical Chemists* 71(2); 1988; 406-409

The assays are based on species-specific, polyclonal antibodies raised against heat-resistant antigens. The heat-resistant antigens were isolated from raw skeletal muscle tissue of pork and chicken and were found to be immunoreactive even after heating to 120 °C for 15 min. The poultry ELISA could detect chicken or turkey at the 126 p.p.m level, and the pork ELISA could detect pork at the 250 p.p.m level. KAR

- 1390 Gailani (MB) and Fung (DYC). Critical review of water activities and microbiology of drying of meats. *CRC Critical Reviews in Food Science and Nutrition* 25(2); 1986; 159-183

Review covers drying of meat, water binding by muscle proteins, factors affecting the water holding capacity of meat, the process of meat dehydration, nutritive value of dried meat, microbial quality; water activity and microbiology. 147 references. BV

- 1391 Heinevetter (L), Gassmann (B) and Kroll (J). Evaluation of the water binding properties of meat binders, substitutes and extenders by different physical and chemical methods. *Nahrung* 31(9); 1987; 889-898

In water uptake on the BAUMANN apparatus activation energies comparable to diffusion processes and enzymic reactions and not comparable to chemical reactions are favoured. Water taken up on the BAUMANN apparatus predominantly is freezable. Powdered proteinaceous materials do not take up water discontinuously by strictly limited surface areas and perforations. At first the geometrical surface is completely wetted. Not till then water will be bound by capillary effects. Thus only upto a certain degree of moistening (water activity 0.92) the more water is bound, the lower the materials's solubility. Afterwards solubility, capillary suction pressure and swelling (increasing pore space) will compete. KAR

- 1392 Sadowska (M) and Rudzki (J). The chemical and functional properties of meat collagen. *Lebensmittel-Wissenschaft und-Technologie* 20(4); 1987; 171-173

Collagens isolated from different connective tissues of mature leaf do not differ significantly in gross chemical composition, except for intramuscular collagen which contains less hydroxproline and fewer bonds sensitive to hydroxylamine. The functional properties of the collagens are very similar regardless of the source of isolation. Reduction in the number of basic or acidic groups in the collagen has a detrimental effect on the water holding capacity and gel forming ability of the material. BV

- 1393 Xiong (YL), Brekke (CJ) and Leung (HK). Thermal denaturation of muscle proteins from different species and muscle types as studied by differential scanning calorimetry. *Canadian Institute of Food Science and Technology Journal* 20(5); 1987; 357-362

Thermal denaturation of muscle proteins from beef, pork and lamb ribeye, and from chicken breast and thigh was studied. The mammalian

and the chicken thigh muscles exhibited three endothermic transitions with peak temp. max. (T_m) near 58, 66 and 79 °C, but the precise T_m 's were species and pH dependent. Studies of protein fractions from chicken thigh indicated that the second transition was due to the combined effects of thermal denaturation of sarcoplasmic and connective tissue proteins and the third transition was due to actin. Chicken breast muscle demonstrated a complex thermal curve with five peaks at 57, 62, 67, 72 and 79 °C (T_m). The middle three peaks were attributed to connective tissue and sarcoplasmic proteins. KAR

Beef

- 1394 Smith (GC), Bellinger (JW), Savell (JW), Murphey (CE) and Cross (HR). USDA quality grades and palatability of loin steaks from calf and young beef carcasses. *Journal of Food Quality* 10(5); 1987; 359-374
- 1395 Stolle (FA). *Salmonella* contamination of equipment and beef carcasses in the Berlin (West) slaughterhouse evaluated by various enrichment procedures. *Journal of Food Safety* 8(4); 1987; 211-218

In this paper the information on the incidence of contamination in the slaughter house of Berlin in which cattle from various European countries were slaughtered and the aspects of different enrichment steps have been emphasized. On examination of the samples 3.66% of the samples were found to be positive for salmonellae. It was found that cutting of the hooves and preskinning gave the highest recovery of *Salmonellae* and less recoveries were obtained after reopening the abdominal cavity whereas removal of head, loosening the skin of head removing the hide and splitting the breast bone and carcass did not result in isolation of the organism and *Salmonella anatum* was the most common isolate. The variations between different enrichment media was attributed to the multiple swab sampling technique used in this study. NGKR

- 1396 Swatland (HJ). Optical properties of white and yellow beef fat in relation to carcass grading. *Canadian Institute of Food Science and Technology Journal* 20(5); 1987; 383-386

Pork

- 1397 Arganosa (GC), Henrickson (RL) and Rao (BR). Collagen as a lean or fat replacement in pork sausage. *Journal of Food Quality* 10(5); 1987; 319-333

Meat products

Ham

- 1398 Marriott (NG), Phelps (SK), Graham (PP) and Shaffer (CK). Effect of inoculation on the quality of dry-cured hams. *Journal of Food Quality* 10(5); 1987; 351-358

In this investigation the influence of inoculating tumbled and dry cured pork legs with microbial flora typical of dry cured and aged

hams on the sensory quality characteristics has been studied. It has been seen that inoculation increased cured colour development of uncooked samples cooked for 56 days and cure time and inoculation had no effect on the juiciness or flavour where as aging increased tenderness and reduced the moisture content. Microbial inoculation did not accelerate the cure penetration rate and had no uniform effect on the quantities of nitrate and nitrite. NGKR

Ham

- 1399 Nute (GR), Jones (RCD), Dransfield (E) and Whelehan (OP). Sensory characteristics of ham and their relationships with composition, visco-elasticity and strength. *International Journal of Food Science and Technology* 22(5); 1987; 461-476

Sausages

- 1400 Bushway (AA), Lecomte (NB), True (RH) and Work (TM). Nutritional, physical and sensory characteristics of a fresh sausage prepared from fowl and mutton. *Canadian Institute of Food Science and Technology Journal* 20(5); 1987; 368-371

Breakfast sausages were prepared from 50% mutton:50% fowl (IM:IS) and from 67% mutton:33% fowl (2M:IS). The nutritional, physical and sensory properties of the mutton:fowl sausages were compared to those of a pork breakfast sausage. Nutritionally, the three sausage formulations were similar except for the concn. of thiamine (0.51, 0.06 and 0.09 mg/100g) in the pork IM:IS and 2M:IS resp. and riboflavin (0.16, 0.06 and 0.07 mg/100g in the pork. IM:IS and 2M:IS resp. which were significantly higher (P less than or equal to 0.05) in the pork sausage. The water holding capacity (WHC) and homogenate stability (ES) of the IM:IS formulation was significantly greater than for the pork or 2M:IS formulations. Shear values for the three sausage formulations were not significantly different. Statistical analysis of the sensory data indicated no significant differences in juiciness, flavour or texture. KAR

- 1401 Heinevetter (L), Gassmann (B) and Kroll (J). Water binding of proteins in the processing of frankfurter-type sausages. Part I. Water-binding ability of freeze-dried meat fractions containing myofibrillar and stromal proteins. *Nahrung* 31(9); 1987; 879-888
- 1402 Pezacki (W) and Pezacka (E). Specific activity of tissue peptidases in fermented sausages manufactured from hot meat. *Acta Alimentaria Polonica* 13(37)(1); 1987; 33-44

Poultry

Chickens

Broilers

- 1403 Basker (D), Angel (S), Bartov (I) and Weinberg (Z). The effects of dietary energy-to-protein ratio variation on the taste quality of

broiler chicken meat. *Journal of Food Quality* 10(5); 1987; 299-310

The present study was carried out on the effect of variation in the energy to protein (E : P) ratio of the diets on the fatness of the meat and taste quality of broiler chicken meat. There was found highest relative taste preference of the meat from males when the starter dietary E : P ratio was approx. 136 and decreased sharply when it was 150 or more which is independent of the age at slaughter and was higher when the age at slaughter was approx. 7. 3 wk with higher levels of the experimental range some preference was noted in the dietary E : P ratio but not at other levels. NGKR

- 1404 Chen (TC), Omer (S), Schultz (D), Dilworth (BC) and Day (EJ). Processing, parts, and deboning yields of four ages of broilers. *Poultry Science* 66(8); 1987; 1334-1340

- 1405 Dawson (PL), Janky (DM), Dukes (MG), Thompson (LD) and Woodward (SA). Effect of post-mortem boning time during simulated commercial processing on the tenderness of broiler breast meat. *Poultry Science* 66(8); 1987; 1331-1333

The relationship between post mortem boning time and breast meat tenderness over a broad range of prerigor and postrigor time intervals under simulated commercial processing conditions has been investigated. MVG

- 1406 Peng (IC), Larsen (JE), Stadelman (WJ), Jones (DJ) and Tonkinson (LV). Processing yields and meat flavour of broilers fed a mixture of narasin and nicarbazin as an anticoccidial agent. *Poultry Science* 66(8); 1987; 1341-1345

The effects of a combination of 50 p.p.m. of narasin and nicarbazin on the processing yields and meat flavour of broilers produce has been studied. Carcass yields of medicated broilers did not show any difference as compared to non medicated broilers. There were also no detectable difference in flavour. MVG

SEAFOODS

- 1407 Perez Martin (RI), Franco (JM), Molist (P) and Gallardo (JM). Gas chromatographic method for the determination of volatile amines in seafoods. *International Journal of Food Science and Technology* 22(5); 1987; 509-514

Trimethylamine (TMA) and dimethylamine (DMA) are determined in marine products by gas chromatography. Presents no problems in analysing extracts of albacore (*Thunnus alalunga*), hake (*Merluccius* sp.) northern shortfin squid (*Illex illecebrosus*) and slender inshore squid (*Loligo plei*). The method is rapid, easy to perform and suitable for simultaneous routine analysis of DMA and TMA in marine products. BV

- 1408 Wells (RMG). Stress responses imposed by fish capture and handling. A physiological perspective. *Food Technology in Australia* 39(10); 1987; 479-481

Physiological and biochemical changes occurring in fish subjected to capture and handling stresses are briefly reviewed. The energy expenditure from capture trauma results in gross disturbances to body chemistry and tissue breakdown and affects the quality of fish. BV

Fish

- 1409 Armbruster (G), Gerow (KG), Gutenmann (WH), Littman (CB) and Lisk (DJ). The effects of several methods of fish preparation on residues of polychlorinated biphenyls and sensory characteristics in striped bass. *Journal of Food Safety* 8(4); 1987; 235-243

The concn. of PCB (Polychlorinated biphenyls) contamination in fifty striped bass was determined in the fish fillets before and after taking boiling, frying, microwaving or poaching to study possible reduction of PCB residues by these cooking methods. The sensory evaluation of the cooked portions showed significant reduction in PCB content but differences due to methods were not found to be significant. However preference was shown to fish prepared by oil based cooking methods as compared to water based methods. NGKR

- 1410 Luisa Rodreiguez (G) and Bello (RA). Preparation of frozen blocks of minced fish flesh, and evaluation during storage. *Archivos Latinoamericanos de Nutricion* 37(2); 1987; 351-363

Minced fish flesh from shrimp by-catch was used as raw material to prepare four frozen blocks under different conditions, as follows (a) Minced fish flesh washed in cool water for 10 min. with continuous stirring (water-fish proportion, 3:1). (b) Minced fish flesh mixed with sodium tripolyphosphate (TPP) (0.5%) and sodium chloride (1%) resp. (c) Minced fish flesh mixed with 0.5% sodium tripolyphosphate 1% sodium chloride and 7.5% corn starch, and (d) Minced fish flesh without any treatment which was used as control. Fish blocks were frozen at -40 C and stored at -10 C and -30 C freezing points during a six-months period. Physical, chemical and microbiological tests were performed during the storage period. The results obtained indicate that frozen fish blocks stored at -10 C deteriorate faster than those stored at -30 C. The TPP, sodium chloride and corn starch treatments were not effective in reducing protein denaturation, but they do increase the water retention capacity of the blocks. AS

- 1411 Sambasiva Rao (KRS) and Padmavathi (P). The levels of main organic constituents in three edible fresh water fishes. *Indian Journal of Fisheries* 34(2); 1987; 227-229

Of the three fresh water fishes examined the levels of total carbohydrates, total proteins, total lipids, glycogen, free amino acids and free fatty acids were high in *Channa punctatus* followed by *Mystus vittatus* and *Tilapia mossambica* in the tissues of liver, muscle and gill. Tissue wise, the levels of these organic constituents were

high in liver, followed by muscle and gill tissues. Of these *Channa punctatus* is highly nutritious due to its rich organic constituents present in all the tissues. KAR

Carp

- 1412 Bunge (G), Steinhart (H), Schwarz (FJ) and Kirchgessner (M). The influence of different types of fat with different Alpha-tocopherol acetate additions on the nutritive contents in the edible portion of carp (*Cyprinus carpio* L.). *Deutsche Lebensmittel-Rundschau* 84(2); 1988; 38-41

Ghol fish

- 1413 Tanuja (R) and Ramachandran (A). Ghol fish and its utilization. *Seafood Export Journal* 20(4); 1988; 15, 17-19

Reference has been made briefly to the products like frozen gutted ghol, frozen headless gutted ghol and skinless fillet that could be prepared from gholfish (*Pseudosciaena diacanthus*). MVG

Whittings

- 1414 Wood (CD), Evans (NJ) and Walker (DJ). The effect of salt on the susceptibility of dried whiting to attack by dermestid beetles. *Tropical Science* 27(4); 1987; 223-228

Air-dried whiting fillets were infested under controlled conditions with laboratory strains of *Dermestes maculatus* Degeer and *Dermestes frischii* Kugelann which had not previously been exposed to salt. The effect of different salt contents on the numbers of insects and the wt. losses of the fish were recorded over a period of approx. 10 wk. The max. wt. losses in unsalted fish varied between trials and ranged from 15 to 41%. Increase in salt content, above the natural 2% level to 5% did not give any marked protection against insect infestation and there is an indication that levels of salt in this range may possibly increase wt. loss. A salt content of greater than 9% largely protected the fish from damage, reduced wt. losses to less than 10% and greatly inhibited insect development. Salting appeared to be equally effective in preventing damage by either species of beetle. It is possible that strains of *D. frischii* may have different tolerance to, salt. AS

Octopus

- 1415 Shenoy (AS). Octopus - a delicacy in Japan. *Seafood Export Journal* 20(4); 1988; 21-22, 24-25

Products prepared from octopus in Japan include boiled octopus, vinegared octopus, seasoned octopus, smoked octopus, and dried octopus. The guidelines prescribed for importing octopus are also given. KAR

Prawns

- 1416 Godavari Bai (S). Effect of calcium and magnesium impurities in common salt on the carotenoid pigments in canned prawns. *International Rice Research Newsletter* 22(5); 1987; 569-570

Shellfish

- 1417 Harris (CH) and Johnson (JM). Select nutrient comparison of imitation shellfish with real shellfish. *Journal of Food Quality* 10(5); 1987; 335-342

In this paper the nutrient composition of imitation shellfish was compared to that of real shellfish. Lipids, carbohydrates, sodium and potassium were analysed by gas chromatography, high pressure liquid chromatography, A.O.A.C. methods and atomic absorption spectrophotometry. The analysis of variance showed significant differences in the nutrients between imitation shellfish products and corresponding real shellfish. NGKR

PROTEIN FOODS

Infant foods

- 1418 Guiro (AT), Sall (MG), Kane (O), Ndiaye (AM), Diarra (D) and Sy (MTA). Protein-calorie malnutrition in Senegales children. Effects of rehabilitation with a pearl millet weaning food. *Nutrition Reports International* 36(5); 1987; 1071-1079
- 1419 Harris (DA), Burns (RA) and AliR). Evaluation of infant formula protein quality: Comparison of in vitro with in vivo methods. *Journal of the Association of Official Analytical Chemists* 71(2); 1988; 353-357
- 1420 Hood (RL). The biotin content of infant foods. *Nutrition Reports International* 36(5); 1987; 1039-1042

Biotin concn. in 26 canned or bottled infant foods ranged from 2 to 24 mg/g. Highest concn. were in foods where egg, and non-fat milk foods in which cereals and meat were the major food ingredient. The daily intake for infants less than one year of age is likely to be lower than that recommended as an estimated safe and adequate dietary intake by the United States Food and Drug Administration. MVG

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

- 1421 Chopineau (J), McCafferty (FD), Therisod (M) and Klibanov (AM). Production of biosurfactants from sugar alcohols and vegetable oils catalyzed by lipases in a nonaqueous medium. *Biotechnology and Bioengineering* 31(3); 1988; 208-214

Biosurfactants are surface active compounds which have applications in numerous areas such as for enhanced oil recovery and in foods, beverages, cosmetics, pharmaceutical preparations. The enzymatically prepared sugar alcohol esters have been found to be excellent surfactants in terms of their ability to reduce interfacial and surface tensions and to stabilize emulsions. Porcine pancreatic and *chromobacterium viscosum* lipases catalyzes transesterification, reaction between a number of sugar alcohols and various plant and animal oils in dry pyridine. The product of this process have been identified as primary monoesters of sugar alcohols and fatty acids. GAR

Alcoholic beverages

Beer

- 1422 Dale (CJ) and Young (TW). Fractionation of high molecular weight polypeptides. from beer using two dimensional gel electrophoresis. *Journal of the Institute of Brewing* 94(1); 1988; 28-32

Beers prepared from 100% malt and malt plus 20% wheat were analysed for their high mol. wt. polypeptides. The fractionation of polypeptides by two dimensional gel electrophoretic method comprising isoelectric focussing in the first dimension followed by gradient gel electrophoresis in the second dimension. The gels stained with silver nitrate revealed complex pattern of spots consistent with individual polypeptide species having both discrete isoelectric points and mol. wt. The beers prepared by malt plus wheat were shown to contain four polypeptides of approx. mol. wt. 30,000, 30,000, 16,000 and 15,000. The polypeptides were absent in all malt beers. NGM

- 1423 Dale (CJ) and Young (TW). A simple method for the isolation of purine nucleosides from wort and beer using column chromatography. *Journal of the Institute of Brewing* 94(1); 1988; 33-37

The purine nucleosides of wort and beer were fractionated by column chromatography consisting of Sephadex G10, G25, LH20 and sephasorb HP dextran. The isolated fractions were analysed for the presence of carbohydrates and nucleosides. The gel matrices Sephadex G10 and sephasorb HP ultrafine were found to elute guanosine deoxyguanosine, adenosine and deoxyadenosine in a single fraction whereas Sephadex LM20 and Sephadex G25 both yielded two fractions containing nucleosides. The first nucleoside containing fractions from Sephadex LM20 contained guanosine and second fraction contained deoxyguanosine, adenosine and deoxyadenosine, whereas the first fraction from Sephadex G25 contained both adenosine and deoxyadenosine and the second fraction contained guanosine and deoxyguanosine. NGM

- 1424 Dale (CJ) and Young (TW). Rapid methods for determining the high molecular weight polypeptide components of beer. *Journal of the Institute of Brewing* 93(6); 1987; 465-467

Size exclusion chromatography and a coomassie blue dye-binding assay were used to investigate the high mol. wt. polypeptide fractions

of beer. Size exclusion chromatography using small columns of Sephadex G25, G50, (10ml) and G75 (20ml) together with an automated FPLC system enabled the rapid isolation of high mol. wt. polypeptide fractions of beer. Size exclusion chromatography using small columns of Sephadex was investigated as a method for the detn. of the total high mol. wt. polypeptides in beer. The results from the analysis of a series of pilot brewery beers produced under standardised brewing conditions showed that the head retention value of a beer correlated with the content of high mol. wt. polypeptide material regardless of the mol. wt. fraction assayed. Both methods may be used to monitor the high mol. wt polypeptide content, predict the head retention value of a beer and are sufficiently rapid for routine use in the quality control laboratory. AS

- 1425 Enari (T-M). Prospects of biotechnology for brewers. *Journal of the Institute of Brewing* 93(6); 1987; 501-505

New developments in biotechnology which have opened many possibilities for developing new malting barley varieties, malting techniques and fermentation have been reviewed. MVG

- 1426 Fors (SM) and Nordl (H). Lager-type beer made from extruded malt. Sensory and chemical analyses. *Journal of the Institute of Brewing* 93(6); 1987; 496-500

A lager-type beer was produced using green malt mixed with extruded malt as ingredints. Sensory and chemical evaluations were performed to analyse whether a more strongly flavoured and balanced beer could be obtained. Comparisons were made with normal lager beer and beer produced with green malt. The two types of beer were different in task, as for example, the extruded beer had a thinner flavour perhaps due to its low bitterness. MVG

- 1427 Tsai (CW) and Briggs (DE). Refinements of the casein turbidity method for measuring proteases in beer. *Journal of the Institute of Brewing* 94(1); 1988; 9-13

The casein turbidity for determining papain in beer is improved to enable it to apply for both normal and strong beers. The pH of the reaction mixture was controlled by a double strong phosphate buffer which prevented coagulation of casein when added to strong beers. The methodology for preparation of convenient substrate and activator solutions that are stable for 8 days at 4 C are given and it is suggested that the estimation should be carried out at 60 C instead of 50 C to quicken the assay. The mixing sequence of beer, activator solution (potassium metabisulphate containing cysteine), the substrate solution and the buffer strengths influence the activity of papain. NGM

Hops

- 1428 Buckee (GK) and Baker (CD). Estimation of Alpha and Beta acids in hop extracts by HPLC. *Journal of the Institute of Brewing* 93(6); 1987; 468-471

A procedure relying on HPLC for the estimation of Alpha acids and Beta acids in hop extracts has been collaboratively and is recommended for use. No significant differences were found between precision values obtained using peak height and peak area measurements. KAR

Malt

- 1429 Johnson (P), Pfab (J) and Massey (RC). Development of methods for the characterisation of non-volatile N-nitroso compounds in malt. *Journal of the Institute of Brewing* 94(1); 1988; 19-22

The apparant total N-nitroso compounds (ATNC) from oil fired and electrically heated kiln malt wort were extracted with ethyl acetate, and estimated by chemiluminescence detection of nitric oxide. The pH extract profile suggested that the majority of ATNC in wort contain acidic functional groups. The chromatographic and mass spectroscopic analysis indicated that the ATNC consists of a large number of minor components. NG

- 1430 Kerhardy (F), Bureau (D) and Mayer Daussant (J). Purification of barley malt Alpha-amylase by immunoaffinity chromatography. *Journal of the Institute of Brewing* 94(1); 1988; 38-41

Malting

- 1431 Cantrell (IC). Industrial scale research into malting and brewing problems. *Journal of the Institute of Brewing* 93(6); 1987; 487-495

Some of the problems encountered during commercial processing and the steps taken to gain an understanding of their origins are highlighted to advance practical solution. Three major topics, describing research into malting, fermentation and downstreams processing, are discussed. MVG

Worts

- 1432 D'Amore (T), Panchal (CJ) and Stewart (GG). The effect of osmotic pressure on the intracellular accumulation of ethanol in *Saccharomyces cerevisiae* during fermentation in wort. *Journal of the Institute of Brewing* 93(6); 1987; 472-476

Intracellular accumulation of ethanol was observed in *Saccharomyces cerevisiae* during the early stages of fermentation (3h) in wort. After 12 h fermentation, the intracellular and extracellular ethanol concn. were similar. Increasing the osmotic pressure in wort by adjusting the carbohydrate concn. from 10 to 20 plato, was observed to cause an increase in intracellular ethanol concn. and glycerol production. Thus, increasing the carbohydrate concn. in wort to at least 20 plato did not affect cell growth and fermentation rates, but produced more ethanol. KAR

Ciders

- 1433 Sabh (AG), Drilleau (JF), Calvin (JF), Divies (C) and Bourgeois (CM). A survey of microbiological aspects of cider making. *Journal of the Institute of Brewing* 94(1); 1988; 5-8

Wines

- 1434 Grossmann (M) and Rapp (A). Enhancement of the variety-typical wine bouquet after enzyme treatment. *Deutsche Lebensmittel-Rundschau* 84(2); 1988; 35-37

A Beta-glycosidic bonding is typical of bound terpenes. The same bonding type occurs with botrytis-Beta-glucan, a poly-saccharide that leads to filtration derangements with wine. Glucanase preparations and also pectinase preparations with a glucan hydrolytic by-activity will help to decompose these sugar colloids. In some commercially available enzyme preparations we could trace a beta-glucosidase activity which remained intact, even with pH values common in wine, over several wks. After 3 wk, it amounted still to 90% of the starting activity. When a glucanase product had been added to Morio-Muscat wine directly after fermentation, the concn. of free terpenes increased heavily. In a covered wine testing, the samples with glucanase added were evaluated to show a more pronounced species typicalness and were considered to be of higher value than the blind wine samples. AS

- 1435 Konieczna (E), Wzorek (W), Pikto-Pietkiewicz (M) and Tobolska (M). Attempts at shortening madeirization of fruit wines by the method of sherrization. *Acta Alimentaria Polonica* 13(37); 1987; (1) 45-55

Studies were made to check the possibility of shortening the time of madeirization of fruit wines by performing submerged sherrization (at 18 C for 10 days) prior to a 7-14 day process of heating at 45 C. Madeirization at 55 C for six wks was performed for comparison. Single-fruit wines (apple, strawberry and currant) as well as mixtures of these wines were processed. AS

- 1436 McDaniel (M), Henderson (LA), Watson (BTJr) and Heatherbell (D). Sensory panel training and screening for descriptive analysis of the aroma of Pinot Noir wine fermented by several strains of malolactic bacteria. *Journal of Sensory Studies* 2(3); 1987; 149-167

A sensory panel was selected and trained to describe the aroma of Pinot noir wines which were fermented by different strains of malolactic bacteria. The panel developed a ballot consisting of 33 aroma descriptors and rated the wines using a balanced incomplete block design. Significant differences were found in twenty of the aroma descriptors, showing that the strain of malolactic bacteria selected for use can effect aroma perception. KAR

Non-alcoholic beverages

Fruit juices

Orange juices

- 1437 Bricout (J) and Koziat (J). Control of the authenticity of orange juice by isotopic analysis. *Journal of Agricultural and Food Chemistry* 35(5); 1987; 758-760

The detection of adulteration of orange juices with sugar is possible to determine the $^{13}\text{C}/^{12}\text{C}$ ratio of sugar from orange juice which is lower than the ratio in cane or corn sweetener but similar to beet sugar. The $^2\text{H}/^1\text{H}$ ratio of non exchangeable carbon bound hydrogen in sugar from orange and beet have been determined and the difference in (2H) of these two sources of sugars is found to be quite large which is attributed to the difference of climate in which these two plants are grown. NGKR

FATS AND OILS

- 1438 Schwartz (DP). Improved method for quantitating and obtaining the unsaponifiable matter of fats and oils. *Journal of the American Oil Chemists' Society* 65(2); 1988; 246-251

A modified quantitative method for saponification and isolation of the unsaponifiable matter (UM) of oils and fats is described. The min. time needed for saponification of different oils/fats varied from 30 to 60 min. at 130 °C using coarsely powdered potassium hydroxide (6 g) in a pestle and mortar. The oil or melted fat (10 g) was pipetted into the powder. The ingredients were ground with little water (2 ml) and heated in a oven at 130 °C. Hexane:dichloro methane, 1:1 solvent mixture was used for extracting UM. The method compares favourably with the AOAC method, but is not applicable for marine oils. MNK

Fats

- 1439 McClements (DJ) and Povey (MJW). Solid fat content determination using ultrasonic velocity measurements. *International Journal of Food Science and Technology* 22(5); 1987; 491-499

The ultrasonic group velocity has been measured through 0-20% mass fraction samples of tristearin, tripalmitin, trilaurin and 1-oleodipalmitin suspended in paraffin oil at 25 °C and 1 MHz. For tristearin, tripalmitin and trilaurin there is an increase of about 3.1 m/sec per 1% increase in insoluble triglyceride in suspension. For trilaurin and 1-oleodipalmitin there is a slight decrease in velocity with increasing soluble triglyceride. The technique may, prove useful for detn. of solubilities of triglycerides in suspension, as well as for determining solid fat contents. The technique is easily

automated, cheap, accurate, rapid and non-intrusive. KAR

Beef tallow

- 1440 Kosugi (Y), Suzuki (H) and Funada (T). Hydrolysis of beef tallow by lipase from *Pseudomonas* sp. *Biotechnology and Bioengineering* 31(4); 1988; 349-356

Presently producing fatty acids from beef tallow is a problem due to its higher melting point than the temp. at which commercial lipase from *Candida* sp. is stable. *Pseudomonas* sp producing the most-able lipase was isolated which hydrolyze beef tallow to high reactive ratio. Lipase produced by *Pseudomonas fluorescens* biotype 1 was selected for hydrolyzing beef tallow at 50-70 C to more than 90% of reaction ratio. Kinetics of lipase activity has been studied. Increasing the lipase above the amount required to reach equilibrium caused a decrease in the rising time. The feasibility of using parameters obtained by a hyperbolic simulation of the progress curve is discussed. GAR

Fatty acids

- 1441 Grandgirard (A), Julliard (F), Prevost (J) and Sebedio (JL). Preparation of geometrical isomers of linolenic acid. *Journal of the American Oil Chemists' Society* 64(10); 1987; 1434-1440

Palmitate

- 1442 Schwartz (SJ). Cis-trans isomerization of retinyl palmitate in foods. *Journal of Agricultural and Food Chemistry* 35(5); 1987; 748-751

This investigation was carried out to study the mechanism for the formation of 13-Cis retinyl palmitate in foods and to find out whether isomerisation of all trans-retinyl palmitate can be done by any treatments adopted in food processing. Experiments were carried out by heat treatment at 120-170 C of all trans-retinyl palmitate for various time intervals and the results showed an increase in the ratio of 13-Cis all trans ranging from 0.15-0.63. It has been found that commercial retinyl palmitate samples used for fortification and supplementation had variable quantities of 13-Cis-isomer. This isomerisation has been brought about in food products containing retinyl palmitate particularly by indirect sunlight and heating. NGKR

Margarines

- 1443 Davey (KR) and Jones (PN). Measurements on pastry margarines using a sliding pin consistometer. *Journal of Texture Studies* 18(4); 1987; 335-338

A sliding pin consistometer (SPC) has been shown to be suitable for differentiating between three commercial pastry margarine products described as Hard, Medium and Soft at sample temp. of 20 and 10 C which are found to be significant. The SPC average force values were found to be proportional to sample temp. over the range of 0.6 - 37

C. This SPC was found to have an advantage over other widely used extruders or penetrometers as it is portable and easy to use and gives objective information which is useful for pastry margarine manufactures as a simple quality test. NGKR

Oils

- 1444 Robards (K), Kerr (AF) and Patsalides (E). Rancidity and its measurement in edible oils and snack foods. A review. *Analyst* 113(2); 1988; 213-224

Chemistry of rancidity with various methods of its measurement have been discussed. Measurement of hydrolytic rancidity, oxidative rancidity, peroxide value, thiobarbituric acid test, anisidine value have been elaborately reported. N

- 1445 Sajid Husain, Sastry (GSR), Kifayatullah (M), Sarma (GVR) and Nageswara Rao (R). Carbon -13 NMR spectroscopic determination of fatty acid composition of a few edible oils. *Journal of the Oil Technologists" Association of India* 19(1); 1987; 11-13

The chemical characteristics of safflower, rice bran, sesame, groundnut, soybean, cottonseed, palm and coconut oils in terms of saturates, monoenes, and dienes have been derived using ^{13}C NMR spectroscopy. Quantitative ^{13}C NMR spectra of 8 edible oils have been recorded in cadmium chloride by suppressing Nuclear Overhauser Effect (NOE) using gated decoupling technique. The ^{13}C NMR carbon resonances utilized for analytical purpose are at 24.8, 25.7 and 27.3 p.p.m. The results are in good agreement with those obtained by GLC method within 5% variation. KAR

- 1446 Sumathi Vedanayagam (H) and Kota Gangiah. Computer-aided analysis of C NMR spectra for estimation of fatty acid composition of oils. *Journal of the Oil Technologists" Association of India* 19(1); 1987; 6-11

The fatty acid composition of groundnut and palmolein has been determined with the help of natural abundance ^{13}C Fourier transform pulse nuclear magnetic resonance (NMR) spectroscopy and computer. The spectra are fitted to non linear regression models of least squares by conjugate gradient method with restarts to obtain an accurate estimation of acids as all the peaks of NMR are utilised in computation. The results when compared with the gas liquid chromatographic analysis of methyl esters of the oils are found to be in good agreement. AS

Chilli oils

- 1447 Sarala Reddy (B) and Sarojini (G). Chemical and nutritional evaluation of chilli (*Capsicum annum*) seed oil. *Journal of the American Oil Chemists" Society* 64(10); 1987; 1419-1422

Cottonseed oils

- 1448 Taha (FS), Helmy (HE) and El-Nockrashy (AS). Changes in cottonseed oil when used for frying vegetable products containing chlorophyll. *Jour-*

nal of the American Oil Chemists" Society 65(2); 1988; 267-271

The changes that take place in cottonseed oil when used for frying "Tameya" were investigated. The absorption spectra of cottonseed oil (CSO) and cottonseed oil + chlorophyll (CSO + Chl) at wavelength range 500-700 nm showed a sharp peak at 667 nm for CSO + Chl for one month resulted in a shift in the absorption maxima at 667 to 670 nm and the appearance of a band at 610 nm, characteristic of pheophytin. Heating of CSO + Chl at the frying temp. resulted in the disappearance of all maxima. The peroxide value of CSO + Chl increased due to storage for one month but decreased when CSO + Chl was heated for one h. KAR

Fish oils

- 1449 Morales (LJ) and Sueyoshi (IJ). The use of hydrogenated fish oil to extend vegetable oil. *Archivos Latinoamericanos de Nutricion* 37(2); 1987; 333-341

This paper describes a process for obtaining fish fat with a melting point of 35-50 C and an iodine index of 50 - 90 and to use this oil as extender of vegetable oil for its utilization for frying, and in bread production. Results of the sensory tests indicate the possibility of using up to 30% extension of this oil with vegetable oils for frying, and upto 50% extension for baking without affecting acceptability of product. BV

Palm oils

- 1450 Ho (CC) and Tan (YK). The treatment of anaerobically digested palm oil mill effluent by pressurised activated sludge. *Journal of Chemical Technology and Biotechnology* 41(1); 1988; 75-84

The application of the pressurised activated sludge process in the secondary treatment of anaerobically digested liquor of palm oil mill effluent (POME) as effluent under various physical conditions was studied. Separation of the particulates was by way of a dissolved air flotation unit. Results showed that a high efficiency in pollutant removals could be achieved and the final treated water was of good effluent quality. The high efficiency of the process was linked to the high rate of oxygen transfer at elevated pressure in the reactor. With a dissolved oxygen level of 10-14 mg dm⁻³ in the reactor, filamentous growth and sludge bulking were prevented. The kinetic coeff. for the process were also evaluated. It is envisaged the process could complement the anaerobic digestion in a two stage complete treatment system for POME. AS

- 1451 Wong (ML), Timms (RE) and Goh (EM). Colorimetric determination of total tocopherols in palm oil, olein and stearin. *Journal of the American Oil Chemists" Society* 65(2); 1988; 258-261

By using a preliminary heat-bleach at 250 C the Emmerie-Engel method has been adapted for the detn. of total tocopherols (including tocotrienols) in crude as well as refined palm oil, olein and stearin.

Total tocopherol contents found were: crude palm oil, 794 p.p.m (n = 10); RBD palm oil, 563 p.p.m (n = 13); RBD palm olein, 643 p.p.m (n = 40); RBD palm stearin, 261 p.p.m (n = 19), where n is the number of samples analyzed. During the detergent fractionation no tocopherols were lost, but the tocopherols were conc. in the olein fraction. The fate of the tocopherols during degumming, bleaching and steam refining/deodorizing of crude palm olein containing 978 p.p.m total tocopherol was studied. Over the whole refining process only 8% of the tocopherols were lost, 62% of the original tocopherols were retained in the RBD palm olein, while the remaining 30% were conc. the fatty acid distillate which contained 7,040 p.p.m tocopherol. AS

Rhus wallichii

- 1452 Kabir (M), Ahmad (I) and Ansari (WH). Fatty acids from Anacardiaceae seed oils. *Journal of the Indian Chemical Society* 64(1); 1987; 66-67

Air-dried seeds of *Rhus wallichii* and *Choerospondias axillaris* have been analysed for oil contents and fatty acids compositions. *Rhus wallichii* seeds contained 12.7% of oil having a fatty acid composition of palmitic acid 69.8%, linoleic acid 20.6%, and oleic acid 6.8%. *C. axillaris* seeds contained 8.1% oil containing linoleic acid 60.7%, oleic acid 27.1%, and palmitic acid 11.0%. The oil could be used in confectionery products. KAR

Rice bran oils

- 1453 Belavadi (VK) and Bhowmick (DN). An investigation of rice bran oil tank settling. *Journal of the American Oil Chemists' Society* 65(2); 1988; 241-245

A wax-like settling is observed in tanks in which rice bran oil is stored. "Soft" and "hard" wax fractions have been isolated from this settling by solvent crystallization. The present work describes the column chromatographic analysis of unhydrolyzed tank settling. The presence of an aromatic moiety is indicated in the infra red spectrum. Comparison of data obtained by analysis of the tank settling before and after hydrolysis shows that it contains only 33% of monomeric esters; the remainder may be present as a polymeric ester, as found in carnauba wax. KAR

- 1454 Kalpagam Polasa and Rukmini (C). Ames mutagenicity test of deep fat fried foods prepared using rice bran oil as frying medium. *Journal of the Oil Technologists' Association of India* 19(1); 1987; 15-17

Four snack foods (i) Muruku made from Bengal gram powder, rice flour and salt, (ii) Boondi made from Bengal gram flour and sugar, (iii) Shakarapara made from refined wheat flour and sugar, and (iv) Arisalu made from rice flour and sugar were prepared by deep fat frying in rice bran oil at 180 plus or minus 3 C and compared with similar preparation fried in groundnut oil as controls. The ground snacks were homogenised and fractionated into polar and non-polar fractions. These fractions were taken in DMSO and tested in bacterial system using *Salmonella typhimurium* tester strain TA 98 and TA 100

using S9 fraction of rat liver homogenate for metabolic activation. None of the deep fat fried foods prepared in rice bran oil showed any mutagenicity either with or without metabolic activation, thereby showing that deep fat fried food in rice bran oil is as safe as foods fried in groundnut oil. KAR

- 1455 Nasirullah and Nagaraja (KV). Rice-bran lipids. a review. Journal of the Oil Technologists" Association of India 19(1); 1987; 2-6

The review covers aspects like isolation/fractionation of lipids; and characteristics of lipids including neutral lipids, glycolipids, glycerolipids, phospholipids, ceramides and wax lipids of rice bran. KAR

Sesame oils

- 1456 Fukuda (Y), Osawa (T), Kawagishi (S) and Namiki (M). Oxidative stability of foods fried with sesame oils. Journal of Japanese Society of Food Science and Technology '(Nippon Shokuhin Kogyo Gakkaishi') 35(1); 1988; 28-32 (Ja).

The deterioration of oils and the degradation of antioxidants in crouton fried with sesame or corn oils were examined. After storage at 60 °C for one month, the PV (meq/kg) of each oil extracted from crouton was 613.0 (corn oil), 80.0 (unroasted sesame oil) and 6.0 (roasted sesame oil), resp. Tocopherol in crouton fried with corn oil was diminished after one month storage, whereas that fried with unroasted sesame oil remained about 70%, and that fried with roasted seed oil almost unchanged. About 40% of sesaminol (UNRunroasted sesame oil) or 66% of sesamol (roasted sesame oil) was remained. Consequently, in spite of larger amounts of tocopherol in corn oil than in sesame oils, excellent oxidative stability of crouton fried with both sesame oils was observed. GB

Soybean oils

- 1457 Lakshminarayana (G), Paulose (MM) and Rao (KVSA). Selective reduction of linolenic acid content in Indian soybean oil by partial hydrogenation. Journal of the Oil Technologists" Association of India 19(1); 1987; 17-19

Indian soybean oils were hydrogenated in 0.5 and 15 kg batches using indigenous Ni catalyst to reduce linolenic acid content, selectively. Hydrogenation at 180 °C and 30 psig with 0.03% Ni (0.19% commercial catalyst) to an iodine value of 105-110 lowered the linolenic acid selectively to < 1%. The oil obtained is slightly cloudy at room temp. (20-30 °C) and it could be marketed as cooking oil. KAR

- 1458 Park (YK), Pastore (GM) and de Almelda (MM). Hydrolysis of soybean oil by a combined lipase system. Journal of the American Oil Chemists" Society 65(2); 1988; 252-254

The hydrolysis of soybean oil by different lipases was compared, and the results demonstrated that lipases D, N and G hydrolyzed the

oil to 44, 42 and 7.2% resp. after 10 h reaction, which represents incomplete hydrolysis. But the combined enzyme systems (lipases (G + N and; lipases G + D) hydrolyzed the oil to an extent of 95-98% after 10 h reaction. Plotting the percentage hydrolysis of soybean oil by combined enzyme systems against the logarithm of the reaction time resulted in essentially straight lines. AS

SPICES AND CONDIMENTS

Condiments

Mayonnaise

- 1459 Harrison (LJ) and Cunningham (FE). Properties of salted yolk solids and their functionality in mayonnaise. *Journal of Food Quality* 10(5); 1987; 343-350

The apparent viscosity, emulsification capacity, and functionality in mayonnaise of plain, free-flow, and low viscosity yolk solids were studied. All three types of yolk solids had considerably higher apparent viscosities than liquid yolk and there was a significant ($P > 0.05$) difference in apparent viscosity between each yolk solids sample. Free-flow yolk solids had the highest apparent viscosity, followed by plain yolk solids and low viscosity yolk solids. Mayonnaise made from liquid yolk had the highest apparent viscosity. Of the mayonnaise samples made from yolk solids, that made from low viscosity yolk solids had an apparent viscosity of 38,250 cps, followed by plain yolk solids mayonnaise 29,500 cps and free flow yolk solids mayonnaise at 23,000 cps. Mayonnaise made from free flow yolk solids had the highest stability at 12 days. Mayonnaise samples made from plain and from low viscosity yolk solids had stabilities of 10 days. KAR

Spices

Capsicum

- 1460 Attuquayefio (VK) and Buckle (KA). Rapid sample preparation method for HPLC analysis of capsaicinoids in capsicum fruits and oleoresins. *Journal of Agricultural and Food Chemistry* 35(5); 1987; 777-779

An improvised procedure for the estimation of capsaicinoids content in capsicum fruits and oleoresins taking sample preparation of about 5 min and extraction and HPLC analysis time of about 25 min/sample has been developed with the use of fast miniblender and commercially available sep-pak filter cartridges. The recovery values are about 98% with almost all the colouring matter and lipid contaminants being removed from the sample before analysis of the capsaicinoids. NGKR

Peppers

- 1461 Ganesh Bhat (B) and Chandrasekhara (N). Effect of black pepper and piperine on bile secretion and composition in rats. *Nahrung* 31(9); 1987; 913-916

The influence of black pepper (*Piper nigrum* L.) and its active principle, piperine on the secretion and composition of bile was investigated in the rat. They were administered by gavage (black pepper at 250 or 500 mg and piperine at 12.5 or 25 mg/kg body wt.) or fed in the diet for 4 wk (black pepper at 0.2 and 0.4% piperine at 0.01 and 0.02%). The lower dose by gavage of black pepper caused an increase in bile solids while with other treatments bile secretion or dry matter in bile was not changed. Dietary feeding of black pepper caused an increase in bile flow with a concomitant decrease in bile solids—a hydrocholagoguic effect. Cholesterol and bile acid output were not affected by black pepper or piperine at either level irrespective of the mode of administration; in contrast, the secretion of uronic acids in bile was enhanced by both levels of pepper as also of piperine indicating possible excretion of some of the components of black pepper or of piperine as glucuronides. AS

SENSORY EVALUATION

- 1462 Castell-Perez (ME), Steffe (JF) and Morgan (RG). Adaptation of a Brookfield (HBTD) viscometer for mixer viscometry studies. *Journal of Texture Studies* 18(4); 1987; 359-365

A low cost mixer viscometer system was developed using a Brookfield viscometer interfaced to a Hewlett Packard (HP) digital cassette drive. The tests were conducted in a Brookfield small sample Adapter with a specially designed flag type mixer impeller. This system when tested for two power law type products viz. apricot puree and guar gum gave results which are comparable to those obtained using a Rheometrics Fluids Spectrometer. NGKR

- 1463 Deman (JM) and Beers (AM). Fat crystal networks. Structure and rheological properties. *Journal of Texture Studies* 18(4); 1987; 303-318

This review covers hypotheses that have been put forward concerning the forces existing between fat crystals rheology of plastic fats, factors that influence the rheological properties of the fat network structure. NGKR

- 1464 Gacula (MJr). Some issues in the design and analysis of sensory data: Revisited. *Journal of Sensory Studies* 2(3); 1987; 169-185

- 1465 Gordin (HH). Intensity variation descriptive methodology: Development and application of a new sensory evaluation technique. *Journal of Sensory Studies* 2(3); 1987; 187-198

The Intensity Variation Descriptive Methodology (IVDM) is a modification of the descriptive analysis procedure used in the sensory evaluation of foods. The technique provides multiple attribute evaluations within specified sections of a product sample. In this study, the IVDM technique was used to quantify changes in attribute intensity as a cigarette sample was consumed. A touch sensitive Hewlett Packard 150 Personal Computer was used as the data collection instrument. Proprietary software was developed which created a graphic representation of an unstructured line scale on the computer screen. Subjects indicated the intensity of sensory attributes, within various sections of tobacco rod, by touching the computer screen anywhere along the line scale. Data obtained from IVDM evaluations indicated that this method was sensitive to the quantitative changes in cigarette smoke components during consumption of the product. The program developed for IVDM testing may be modified for conventional descriptive testing. The application of computers as sensory evaluation data collection instruments was explored. AS

- 1466 Rao (MA), Kash (SF), Cooley (HJ) and Barnard (J). Desktop computer based collection and analysis of creep-compliance data on fluid foods. *Journal of Texture Studies* 18(4); 1987; 405-413

This study was undertaken to develop a computer programme to collect creep compliance data on a desktop computer from a constant shear stress rheometer and to develop a computer programme incorporating non linear parameter estimation sub-routine to calculate magnitudes of creep compliance rheological parameters. This programme was found to be successfully used for analysis of creep compliance data on emulsions and fluid foods. NGKR

FOOD STORAGE

- 1467 Agrawal (RM). Studies on the residues of phosphine in stored food-grains. *Bulletin of Grain Technology* 25(3); 1987; 218-230

The effect of Al phosphide residues on the germination and organoleptic quality of fumigated wheat has been carried out. Wheat with 10, 12 and 15% moisture contents was fumigated at the rate of 2, 3 and 4 tablets of Al phosphide/ton for 7, 14 and 30 days exposure. Results showed that the phosphine residues resulting from treatments in wheat at 10% moisture were found to be 0.01, 0.011, and 0.014 p.p.m. resp. for 7 days exposure at zero h of aeration and wheat with 12 and 15% moisture showed no significant absorption of phosphine. After 2 h of aeration under sun, in an open yard, the residues were found to be 0.007, 0.007 and 0.009 p.p.m.; 0.007, 0.007 and 0.009 p.p.m. and 0.007, 0.008 and 0.01 p.p.m. for 10, 12 and 15% moisture resp. at 2, 3 and 4 tabs/ton treatments and after 4 h of aeration the residues were found to be 0.005, 0.006 and 0.006 p.p.m.; 0.004, 0.005 and 0.006 p.p.m. and 0.005, 0.006 and 0.007 p.p.m. at the above resp. dosage. The milling and baking of the fumigated samples showed great reduction in residues which were also below the detectable level in

baked chapatis. Phosphine fumigation did not affect the wheat germination. NGKR

INFESTATION CONTROL AND PESTICIDES

Pesticides

Insecticides

Malathion

- 1468 Mensah (GWK). Accumulation of malathion residues in grain stored on malathion-treated wood surfaces. *Pesticide Science* 20(3); 1987; 161-166

In this investigation the amount of malathion that can accumulate in single layers of wheat stored on treated wood surface has been determined and reported. Experiments are carried out by treating wood surfaces with malathion 836 g (litre⁻¹) e.c. at 1.0 g a. l. m⁻² and estimating the insecticide residues using chemical and biological methods at predetermined intervals of time on three layers of wheat in contact with the wooden surfaces. The results showed that there was an increasing uptake of malathion beyond the layer directly in contact with the treated surfaces and it was found the absorption depended on the period of storage. It was also observed that after 8 wk a sufficient amount of malathion accumulated on the top layer of the grain kernels to effect 100% mortality of the adult insects viz. *Tribolium castaneum* (Herbst). NGKR

Malathion

- 1469 Wilkins (JPG) and Mason (DJ). A study of the trans-esterification products of malathion by capillary gas chromatography-mass spectrometry. *Pesticide Science* 20(4); 1987; 259-270

BIOCHEMISTRY AND NUTRITION

Nutrition

- 1470 Armada de Romano (M) and Adamo (C). Effect of technological processes and fortification on the mineral and in vitro iron availability in vegetable mixtures. *Archivos Latinoamericanos de Nutricion* 37(2); 1987; 342-350

Iron, calcium, zinc and folic acid contents in vegetable blends from wheat, corn and soy were determined. Wheat and corn substitution with soy in compound products, gave an important amount of iron and calcium to the blends, while the initial content of folic acid in wheat and corn was not significantly modified. Dehulling and enzymatic inactivation processes denoted a rather low influence on soy

mineral content. In a similar way, the extrusion-cooking process did not affect appreciably the soluble iron content in blends. Soy incorporation greatly decreased *in vitro* iron availability in vegetable blends, while fortification with mineral blends slightly interfered, decreasing iron availability with regard to iron-fortified vegetable blends. AS

- 1471 Geeta Sharma and Mridula Mahajan. Biochemical assessment of protein calorie malnutrition. *Indian Journal of Nutrition and Dietetics* 24(7); 1987; 199-203
- 1472 Samiuddin (SK) and Narasinga Rao (BS). Hormones and membrane lipids as possible modulators of rat kidney sodium, potassium adenosine triphosphatase in protein energy malnutrition. *Nutrition Reports International* 36(5); 1987; 1053-1059

The possible role of some endogenous modulators like hormones and membrane lipids increase in Na, K-ATPase activity of kidney cells of malnourished rats were studied. In protein restricted rats the plasma levels of thyroxine, triphosphatase and aldosterone were higher than in controls. Only plasma aldosterone was elevated in energy restricted rats. Neither phospholipids, class distribution and cholesterol phospholipid ratio was attended during nutritional stress. The observation show that the enhanced levels of hormones may be atleast partly due to the observed increase in Na, K-ATPase activity under nutritional stress. MVG

- 1473 Walker (J). Modern eating, cholesterol and heart disease. *Food Technology in Australia* 39(8); 1987; 371, 376

TOXICOLOGY

- 1474 Tzouwara-Karayanni (S), Demertzis (PG) and Kontominas (MG). Adsorption of vinylchloride on to plasticised polyvinylchloride by classical partition in the presence of various food simulating solvents: Migration aspects. *Lebensmittel-Wissenschaft und-Technologie* 20(4); 1987; 202-206

The sorption of vinylchloride on to plasticised polyvinylchloride was studied by a static method (classical partition) in the presence of cottonseed oil, 5% acetic acid and 10% alcohol, at 15 °C. The nature of the contact phase, plasticiser content and monomer concn. were examined in particular. The partition coeff. (K_p) of vinylchloride was taken as the major parameter of the monomer/polymer/contact phase interaction. K_p was found to increase with increasing monomer concn. and with increasing plasticiser content, and to decrease along the sequence alcohol > acetic acid > oil. For a given plasticiser content and monomer concn. the effect of contact phase polarity is more pronounced than the effect of monomer concn. and plasticiser content for a given contact phase. AS

Bacteria

Salmonella

- 1475 Green (NR) and Fugua (DL). Mutagenic activity in heat-processed foods as determined by the Ames Salmonella mutagenicity assay. *Journal of Food Safety* 8(4); 1987; 261-266

Different concn. of six commercially available heat-processed foods were screened for mutagenic activity using the Ames Salmonella mutagenicity assay. Bacterial strain TA 98 which detects frame shift mutations was used with S-9 mix prepared from livers of Aroclor 1254 induced rats for metabolic activation. Cornflake cereal, branflake cereal, and a breakfast replacement product were not mutagenic at 90 g concn. or less. At concn. of 20 g or above, liquid smoke was toxic to the bacteria. At lower concn. of 1 and 5 g the bacterial colony survival rate was low, therefore no conclusions were made. A canned brown gravy was not mutagenic at concn. of 75 g or less. The contribution of manufacturers' processing techniques to the formation of chemical mutagens in foods is discussed. KAR

Salmonella typhimurium

- 1476 Larocco (KA) and Martin (SE). Development of stress and survival of *Salmonella typhimurium* ATCC 7136 in a tapioca soy-starch product containing potassium sorbate. *Journal of Food Safety* 8(4); 1987; 279-284

In this study sorbate efficiency against *Salmonella typhimurium* in a formulated IMF (Intermediate Moisture Food) systems adjusted to various water activity values have been examined. In this connection the effects of reduced water activity and 0.1% sorbate on *Salmonella typhimurium* ATCC 7136 in a Tapioca-soy-starch product have been examined by inoculating the product with cells to give a final concn. of approx. 2×10^6 cells/g. These samples were stored at different temp. and humidities giving a range of water activity 0.79-0.97 and growth of cells was examined by using standard procedures. The results showed that cells stored at 22 °C remained viable longer at a water activity of 0.79 than at water activity values of 0.96 to 0.97. The increase in storage time and temp. accelerated these effect. NGKR

Mycotoxins

Aflatoxins

- 1477 Ashley (DL), Orti (DL) and Hill (RHJr). Proton nuclear magnetic resonance evidence for two configurations of the hemiacetals of aflatoxin B1 and sterigmatocystin. *Journal of Agricultural and Food Chemistry* 35(5); 1987; 782-785
- 1478 Yousef (AE) and Marth (EH). Kinetics of interaction of aflatoxin M1 in aqueous solution irradiated with ultraviolet energy. *Journal of Agricultural and Food Chemistry* 35(5); 1987; 785-789

Ultraviolet(UV) irradiation quenches fluorescence of aflatoxin M1

(AFM₁) in aqueous media. Loss of the toxin and development of reaction products, in aqueous solutions, were monitored kinetically during the treatment with 365 nm, low-energy UV irradiation. Loss of AFM₁ followed a pattern similar to that of first-order reactions and was accompanied by production of a reaction product, (AFM₁) that was more polar and more fluorescent than the parent compound (AFM₁). Reaction of AFM₁ was not affected by changes in pH of the reaction medium in the range pH 3-7. Stability of the reaction product (AFM_x) however, was affected by such changes in pH. Conversion of AFM₁ to AFM_x was only slightly affected by temp. in the range 0-60 °C ($Q_{10}=1.3$). Further conversion of AFM_x by UV energy was influenced, to a greater extent, by the temp. of the reaction mixture during irradiation ($Q_{10}=1.13$)

Zeranol

- 1479 Roybal (JE), Munns (RK), Morris (WJ), Hurlbut (JA) and Shimoda (W). Determination of zeranol, zearalenone and their metabolites in edible animal tissue by liquid chromatography with electrochemical detection and confirmation by gas chromatography/mass spectrometry. *Journal of the Association of Official Analytical Chemists* 71(2); 1988; 263-271

A sensitive method is described for the detn. and confirmation of zeranol and zearalenone, as well as their isomers and metabolites, in edible animal tissue. The analytes are extracted from tissue with methanol, hydrolyzed enzymatically, cleaned up by acid base partitioning, determined by liquid chromatography (LC) with electrochemical (EC) detection, and confirmed by gas chromatography/mass spectrometry (GC/MS). LC analysis is performed by isocratic elution with a buffered mobile phase using a Nova-pak reverse-phase C₁₈ column with amperometric EC detection at + 0.90 V. Capillary GC/MS analysis of the trimethylsilyl derivatives provides mass spectral confirmation. AS

FOOD LAWS AND REGULATIONS

Nil

GENERAL

- 1480 Anon. Vast potential for India's processed foods. *Beverage & Food World* 14(4); 1987; 13-15

Covers processed products with high export growth potential. Processed foods covered include vegetable and fruit products, meat and meat products, marine products, potatoes, pasta products, soups, egg powder and other poultry products and policy guidelines. BV

- 1481 Anon. Marking time on irradiation. *Food Manufacture* 63(1); 1988; 36-37, 39

Radiation safety standards has considerably complicated matters creating an unfavourable climate for moves on irradiation as an alternative to chemical treatments. This paper covers current situation world wide. BV

- 1482 Baisya (RK). Some aspects of instant food mixes. *Indian Food Packer* 42(2); 1988; 30-34

After elaborating the different types of instant mixes available in Indian and western countries the author describes about the processing and quality control aspects and also about the present status of the industry in India. KAR

- 1483 Fysh (RR). Malicious tampering with foodstuffs - the forensic scientist's role in the police investigation. *Journal of the Society of Dairy Technology* 40(3); 1987; 70-73

When food is maliciously tampered with, it is essential to determine the nature of the noxious material, establish its hazard to anyone consuming it and gather evidence to arrest the perpetrator of the crime. This paper describes some of the sophisticated methodology available to the modern forensic scientist. AS

- 1484 Hall (JAD). Malt derived products, New Horizon? What does the future hold? *Food Trade Review* 58(1); 1988; 26, 29, 32-33

Reports the possible potential of conventional malt extract as a sucrose replacement in biscuits, night drinks, breakfast cereals etc., as a non diastatic, comparatively low colour source, in bread and biscuit industry; new physical forms of malt, i.e. flaked, kibbled, rolled, etc. have considerable potential in bread and cereal bars production and the new brown colour from malt in future, could become a major source of colour for the industry. BV

- 1485 Peters (CR). *Ricinodendron rautanenii* (Euphorbiaceae): Zambezian wild food plant for all seasons. *Economic Botany* 41(4); 1987; 494-502
- Ricinodendron rautanenii* provides an easily stored sweet-tasting fruit containing a nut whose seed is rich in fat, protein, and minerals. The nuts were traditionally a staple food for the subregion's rural populations of Zambezian. BV
- 1486 Rieder (P) and Egger (U). International agricultural markets and malnutrition in the third world. *Food Reviews International* 3(1&2); 1987; 33-39
- ✓ 1487 Vijay Sethi, Maini (SB) and Anand (JC). Reducing post harvest wastage of fruits and vegetables for proper marketing. *Beverage & Food World* 14(4); 1987; 35-40

FOOD PROCESSING

Nil

FOOD PACKAGING

- 1488 Kumar (KR) and Sreenivas Rao (S). Studies on the packaging of dal moth under different atmospheres. *Beverage & Food World* 14(4); 1987; 7-10
- Moisture sorption isotherm of dal moth a popular Indian savoury food was found to be sigmoid curve typical of a high fatty food. The equilibrium relative humidity at 2.25% moisture content was 17%. The BET-monolayer moisture content was 2.20%. The product, air, N and vacuum packed in metallized polyester/low density polyethylene pouches and stored at 38 °C and 92% RH indicated a shelf-life of 20, 40 and 40 days resp. The corresponding shelf-life at 27 °C and 65% RH were 180, 210 and 240 days resp. and more than 240 days at refrigerated storage condition in all the three types of pouches. Vacuumization gave best protection against deteriorative chemical changes. AS
- 1489 Ladhahoy (AE). Rigid containers in packaging of food products and beverages. *Beverage & Food World* 14(4); 1987; 41-43
- Packaging materials
- 1490 Sacharow (S). EVOH and PVDC. Rivals or allies? *Prepared Foods* 157(2); 1987; 82-83
- 1491 Shimoda (M), Matsui (T) and Osajima (Y). Effects of the number of carbon atoms of flavour compounds on diffusion, permeation and sorption with polyethylene films. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi)' 34(8); 1987; 535-539

Polyvinyl chloride

- 1492 Muller (HA). Attempts to identify organo-tin compounds migrating out of polyvinyl chloride. *Deutsche Lebensmittel-Rundschau* 83(12); 1987; 382-385 (De).

FOOD ENGINEERING AND EQUIPMENT

Engineering

- 1493 Giles (JM). The economics of modernisation of flour mills. *Indian Miller* 18(4); 1988; 15-17, 19, 21, 23, 2

After giving a brief review about the milling industry the author mentions about the recent developments in flour milling industry including cleaning, mill flour system, purification and sizing and plant layout that need consideration while modernising a flour mill. KAR

- 1494 Gupta (NK). Economics of modernisation and increasing the capacity of flour mills. *Indian Miller* 18(2); 1987; 35, 37-45

The modernisation and increasing the capacity of flour mills with min. cost is possible by min supervision, lesser breakdown, cut in the expenditure on maintenance, optimum use of space, maintaining uniform quality of flour with higher yield, restricting power consumption, and automatic control. KAR

- 1495 Kumar (GV). Efficient aspiration system in flour mills. *Indian Miller* 18(4); 1988; 5-7, 9, 11, 13

Aspiration system in flour mills is reviewed under aspects like fans, ducting, cyclones and filters. KAR

- 1496 McKeegan (T). A chilling blast Part 2. Food, Flavourings, Ingredients, Packaging and Processing 10(1); 1988; 47-51

The article looks at ways in which the operation of refrigeration plant can be made more economical. The parameters considered include loss of moisture, temp. difference within the product, intimate contact of the product with a solid or liquid freezing medium and packings. The article has suggested that economics can be made by discovering how temp. vary within the product, and thereby knowing, to a greater degree of accuracy, howlong it needs to remain in the freezing chamber. In addition, if the amount of heat removed from the product is considered, a number of other economics become evident. The combination of irradiation and freezing may offer a sound future, as there is no need to remove the latent heat of fusion, bringing the product down to storage temp. is both quicker and more economical. SYR

- 1497 Stevens (HH). Mill control systems and techniques (Lecture). *Indian Miller* 18(2); 1987; 9, 11, 13, 15, 17-25

The article first discusses about the components of the automated mills systems which includes bin level indicators, feed back loop flow controllers, flow detectors, heat sensors, motion detectors, moisture detectors, limit switches and electrical interlock systems. Under the automated system the main aspect dealt is about the automated conditioning system and computerized mill. KAR

Microwaves

- 1498 Thind (SS), Sekhon (KS) and Sandhu (KS). Microwave applications in food service and food processing industry. *Beverage & Food World* 14(4); 1987; 31-34

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

Chemistry

- 1499 Hohler (A), Nitz (S) and Drawert (F). Formation and sensorial properties of volatile nor-carotenoids 1. Photooxidation of Beta-carotene in N, N-dimethylformamide. *Chemie Mikrobiologie Technologie der Lebensmittel* 11(4); 1988; 115-126

The dye-sensitized photooxidation of Beta-carotene was investigated with regard to the formation of volatile nor-carotenoids and their sensorial properties. From the complex reaction mixture, 27 compounds could be identified by means of appropriate combination of chromatographic/spectroscopic methods and chemical reactions, resp. Mainly, sensory active carboxylic compounds with 8 to 15 C-atoms and mol. wt. ranging between 124 and 234 are formed. The higher yields of C₈ -, C₁₀ - and most of all C₁₃ -compounds indicate that a preferential cleavage at carbon atoms 6, 7/7, 8/9, 10 of the Beta-carotene molecule takes place. Possible reaction mechanisms which can explain the formation of primary and secondary oxidation products are discussed. AS

- 1500 Maga (JA). The flavour chemistry of wood smoke. *Food Reviews International* 3(1&2); 1987; 139-183

Summarizes the types, formation pathways, and sensory properties of important classes of flavour compounds associated with wood smoke; and to discuss the role of wood source, smoke generation conditions, and storage in resulting volatiles. 73 references. BV

- 1501 Price (KR), Johnson (IT) and Fenwick (GR). The chemistry and biological significance of saponins in foods and feeding stuffs. *CRC Critical Reviews in Food Science and Nutrition* 26(1); 1987; 27-135

Nature, occurrence and biosynthesis of saponins in foods; saponins in plants used as foods, (soybeans, beans, peas, oats, *Solanum* sp., *Allium* sp., tomatoes, *Asparagus officinalis* tea, peanuts, spinach, cucurbits, sugar beet, yam and blackberry), plants used as flavourings, health foods, tonics, etc. (Fenugreek, liquorice, nutmeg, quillaja, *Saponaria officinalis*, yucca, gypsophila, herbs, edible seeds), modern techniques in saponin research (isolation and purification, structure elucidation) quantitative detn. of saponins; physiological and nutritional consequences of saponins in foods are the aspects covered. 774 references. BV

Sorbitol

- 1502 Figdor (SK), Allingham (RP), Kita (DA) and Hobbs (DC). Caloric utilization of sorbitol and isomalt in the rat. *Journal of Agricultural and Food Chemistry* 35(6); 1987; 996-1001

Chemistry (Analytical)

- 1503 Umano (K) and Shibamoto (T). Analysis of acrolein from heated cooking oils and beef fat. *Journal of Agricultural and Food Chemistry* 35(6); 1987; 909-912

In this study the amounts of acrolein formed from various heated cooking oils and from beef fat were determined as the morpholine derivative, 3-morpholinopropanal. The headspace volatiles formed from cooking oils or beef fat heated at various temp. were purged into an aqueous morpholine solution with either a nitrogen or an air stream. 3-Morpholinopropanal produced from acrolein and morpholine was extracted with dichloromethane and subsequently analysed by GLC equipped with a thermionic detector and a fused silica capillary column. Five cooking oils and beef fat were separately heated at 300 C for 2 h, and the quantities of acrolein formed were determined. The amount of acrolein formed from 120 g samples ranged from 30 mg (soybean oil) to 72 mg (olive oil). NGKR

- 1504 Weiss (G), Duke (PD) and Gonazales (L). HPLC method for the simultaneous analysis of sulfadimethoxine and ormetoprim in tissues and blood of cattle, chickens and catfish. *Journal of Agricultural and Food Chemistry* 35(6); 1987; 905-909

A suitable method has been developed to estimate quantitatively sulfadimethoxine (SDM) and ormetoprim (OMP) levels in cow, chicken and catfish tissues and cow blood. The method involves extraction from the tissues with methylene chloride at pH 10 after the addition of tetrabutyl ammonium hydroxide to form anion pair with SDM. Both these compounds were separated by HPLC on a Waters μ porasil column and detected at 288 nm. This method is also found to exhibit good recovery and reproducibility values for both compounds at levels between 0.05 and 40.0 p.p.m in tissues and 0.05 and 100 p.p.m in cow blood. NGKR

FOOD MICROBIOLOGY AND HYGIENE

Enzymes

- 1505 El-Refai (AA), Atta (MB) and Harras (AM). Studies on macerating enzymes. II. Macerating activity of different enzymes fractionated from Rohament P. *Chemie Mikrobiologie Technologie der Lebensmittel* 11(4); 1988; 107-114

This study was carried out to estimate the maceration activity of different fractionated enzymes of Rohament P by determining the degradation of fresh and washed carrot preparations, consisting mainly of protopectin, cellulose and hemicellulose. Results of this work corroborated the notion that the macerating activity of Rohament P is due to an endopolygalacturonase. Addition of cellulases to the endopolygalacturonases profoundly modifies the maceration process. These findings may have technological impact because depending on the composition of the technical enzyme preparation, macerating will be accompanied by liquification to an undefined extent. BV

Amylases

- 1506 Yoo (YJ), Cadman (TW), Hong (J) and Hatch (RT). Fed-batch fermentation for the production of Alpha-amylase by *Bacillus amyloliquefaciens*. *Biotechnology and Bioengineering* 31(5); 1988; 426-432

Fed-batch cultures were performed to maximize the Alpha-amylase activity in a bioreactor. Kinetic equations containing a catabolite repression effect were used to model the enzyme formation from *Bacillus amyloliquefaciens*. The enzyme activity from the fed-batch culture employing maltose was higher than that of the batch culture by 60%. Enzyme production using starch showed similar trends to those obtained using maltose.

Fermented foods

- 1507 Anon. Lesser-Known fermented plant foods. *Beverage & Food World* 14(4); 1987; 21-24

Briefly covers fermented products Ting-C (maize meal), Ahai (maize beer of southern Ghana), Pito (acid-alcohol beer brewed from sorghum or millets), Ogiri (watermelon seed fermented products), Ugba (African oil bean seed fermentation), lupin seeds, Farinha puba, Kokonte (cassava based product), Masato (cassava beer), Tepache (maize beverage), Colonche (sweet, fizzy beverage of the prickly pear cacti), Gundruk or Nepalese pickle and Sudanese Kawal. BV

Vinegar

- 1508 Damiani (P) and Burini (G). Fluorometric procedure for determination of acetoin and diacetyl in vinegar. *Industrie Alimentari* 255(26); 1987; 1143-1148

Bacteria

Bacillus

- 1509 Deak (T) and Tima (E). Simplified identification of aerobic spore-formers in the investigation of foods. *International Journal of Food Microbiology* 6(2); 1988; 115-125

A simplified identification scheme for aerobic spore-formers for routine laboratory use was elaborated by reducing the number of tests to be performed. 20 *Bacillus* spp. common in foods were considered. Besides cell morphology six biochemical characters were selected that proved most efficient in identification. In addition, methods were developed and modified to determine these characters by only 3 tests. By applying the simplified identification scheme, 766 strains of bacilli isolated from various foods were tested and species identity of 714 strains (93%) could be determined. Most aerobic spore-formers from foods were *B. subtilis*, *B. pumilus* and *B. licheniformis*. The spectrum of mesophilic bacilli isolated from natural sources was broad and comprised some 20 different species. Only one-third of the thermophilic isolates proved to be identical with, or similar to *B. stearothermophilus*, while the rest were identified as five other species. AS

Escherichia coli

- 1510 Sayadi (S), Nasri (M), Berry (F), Barbotin (JN) and Thomas (D). Effect of temperature on the stability of plasmid pTG201 and productivity of *xylE* gene product in recombinant *Escherichia coli*: Development of a two-stage chemostat with free and immobilized cells. *Journal of General Microbiology* 133(7); 1987; 1901-1908

The effect of temp. on the stability of pTG201, a plasmid carrying the *xylE* gene (which encodes catechol 2,3-dioxygenase from *Pseudomonas putida*), and the production of catechol 2,3-dioxygenase in free and immobilized *Escherichia coli* during continuous culture have been studied at various temp. Immobilization of cells increased the stability of pTG201 considerably, even under conditions when expression of the *xylE* product was enhanced. Since *xylE* transcription was controlled by the Lambda P promoter and C1857 repressor, increasing depression temp. increased catechol 2,3-dioxygenase productivity and decreased pTG201 stability. A two-stage continuous culture system to overcome the impact of the high-level expression of the *xylE* gene on the stability of pTG201 is described. In the first stage, immobilized cells were grown in the repressed state in order to prevent loss of pTG201, whereas in the second stage, cultures were maintained in the derepressed state. AS

- 1511 Yukawa (H), Kurusu (Y), Shimazu (M), Yamagata (H) and Terasawa (M). Maintenance of a mini-F recombinant plasmid in *E. coli* and expression of its tryptophan synthase genes. *Process Biochemistry* 22(6); 1987; 165-168

The maintenance of a recombinant plasmid in *E. coli* and the

expression of tryptophan synthase (TS) genes were examined by the use of the mini-F plasmid, pBR322F-trpBA. The inserted mini-F fragment conferred stable inheritance on this plasmid with high copy number. In this study *E. coli* K-12 strain (wild type) was usable as a host because the transformant of this strain could grow satisfactorily and maintain the plasmid stably. 3-Indole acrylic acid (IA) was added to the culture medium in order to release partially the repression of gene expression from the trp promoter. The addition of IA in the middle of the logarithmic phase of cultivation was effective in avoiding the inhibition of bacterial growth by IA itself and also led to higher expression of TS. The enzymic formation of L-tryptophan from indole and L-serine was examined: about one mole of tryptophan was formed in a litre of reaction mixture at 37 °C after 3 1/2 h. AS

Lactobacillus bulgaricus

- 1512 Mehaia (MA) and Cheryan (M). Production of lactic acid from sweet whey permeate concentrates. *Process Biochemistry* 22(6); 1987; 185-188

Sweet whey permeate powder (WPP, 85% lactose) was reconstituted, supplemented with yeast extract and used for the production of lactic acid by *Lactobacillus bulgaricus*. With the pH maintained at 5.6 and the temp. at 45 °C, complete lactose utilization and good yields of lactic acid were obtained at 5, 10, and 15% WPP in a batch-system. Higher substrate concn. resulted in incomplete lactose utilization and growth inhibition. Under comparable conditions in the CSTR-membrane recycle bioreactor (complete utilization of 134 g/l lactose and product concn. of 110-117 g/l lactate), the optimum productivity was 27-84 g/l h at cell concn. of 30-63 g/l. This is 6-18 times better than the batch reactor. AS

Plesiomonas shigelloides

- 1513 Freund (SM), Koburger (JA) and Cheng-I. Enhanced recovery of *Plesiomonas shigelloides* following an enrichment technique. *Journal of Food Protection* 51(2); 1988; 110-112

Enrichment techniques using five broths (gram-negative broth, alkaline peptone water, tetrathionate broth without iodine and two *Plesiomonas* broths) were compared to direct plating methods using freshwater samples to determine their ability to increase the isolation rate of *Plesiomonas shigelloides*, a suspected food and waterborne pathogen. Tetrathionate broth consistently gave significantly ($p < 0.05$) greater recovery of *P. shigelloides* than the other four broths tested as well as by direct plating. Incubation of the enrichment broths at 40 °C also resulted in significantly higher recovery of *Plesiomonas* than at 35 °C. It is therefore suggested that for routine monitoring of *P. shigelloides*, tetrathionate broth incubated at 40 °C be used for enrichment before plating. AS

Fungi

Mushrooms

- 1514 Alpna Verma, Keshervani (GF), Sharma (YK), Sawarkar (NJ) and Pratibha Singh. Mineral content of edible (dehydrated) mushrooms. *Indian Journal of Nutrition and Dietetics* 24(8); 1987; 241-245

Nutritional evaluation of mushrooms indicated that *Agaricus bisporus* had higher content of P, Ca, Mg, K, Cu, and Mn and *P. Sajor caju* contained more of S, Na and Zn while *Volvariella volvacea* was higher in Fe content. The cap portion of the mushroom contained higher amounts of mineral than stipe portion. NGKR

Pleurotus

- 1515 Rajarathnam (S) and Zakia Bano. *Pleurotus* mushrooms. Part I. A. Morphology, life cycle, taxonomy, breeding and cultivation. *CRC Critical Reviews in Food Science and Nutrition* 26(2); 1987; 157-223

The prospects and problems of some of the aspects related to *Pleurotus* technology such as world production, species cultivation, morphology and life cycle, and culturing methods are discussed in this review. BV

Talaromyces flavus

- 1516 Beuchat (LR). Influence of organic acids on heat resistance characteristics of *Talaromyces flavus* ascospores. *International Journal of Food Microbiology* 6(2); 1988; 97-105

Three strains of *Talaromyces flavus* were investigated for their tolerance to organic acids during and after exposure to elevated temp. Fumaric, sorbic and benzoic acids were clearly more lethal than acetic, malic, citric and tartaric acids, and lethality was enhanced as the pH of the heating medium was reduced from 5.0 to 2.5. Ascospores of a *T. flavus* strain with greater heat tolerance were larger and less ellipsoid in shape than ascospores of a less heat-tolerant strain, as observed by scanning electron microscopy. While both strains are known to develop heat resistance with age, no external differences in shape, degree of ornamentation and size could be discerned between ascospores as influenced by age (11 and 51 day old) of cultures. AS

Yeasts

- 1517 Lin (CCS) and Fung (DYC). Comparative biochemical reactions and identification of food yeasts by the conventional method, Fung's mini method, minitek, and the automicrobic system. *CRC Critical Reviews in Biotechnology* 7(1); 1987; 1-16

Hygiene

- 1518 Franco (DA). *Campylobacter* species: Considerations for controlling a foodborne pathogen. *Journal of Food Protection* 51(2); 1988; 145-153

This comprehensive review covers aspects like historical background to the organism, microbiology of *Campylobacter*, epidemiology which includes, reservoirs, their occurrence and survival in foods of animal origin, modes of transmission. Also covered in the review are clinical manifestations/infection in humans and strategies for prevention and control. The review ends with conclusions and specific recommendations. CTD

BIOTECHNOLOGY

- 1519 Andrews (REJr), Faust (RM), Wabiko (H), Raymond (KC) and Bulla (LAJr). The biotechnology of *Bacillus thuringiensis* CRC Critical Reviews in Biotechnology 6(2); 1987; 163-232

The author reviews the biotechnological aspects of *Bacillus thuringiensis*. Covers history of *B. thuringiensis*, biological properties of *B. thuringiensis* (taxonomy, physiology and insect pathology) biochemistry of the crystalline toxin, molecular biology and gene regulation in *B. thuringiensis* (regulation of crystal toxin synthesis and sporulation), genetics of *B. thuringiensis* (plasmids, cloning, DNA sequence and protoxin subdomain structure), current products formulated with *B. thuringiensis* (product active against lepidoptera and diptera), future applications (natural gene transfer systems, recombinant DNA and molecular cloning), and regulatory considerations. 242 references. BV

- 1520 Beguin (P), Gilkes (NR), Kilburn (DG), Miller (RCJr), O'Neill (GP) and Warren (RAJ). Cloning of cellulase genes. CRC Critical Reviews in Biotechnology 6(2); 1987; 129-162

This review summarizes the current state of knowledge of the genes coding for cellulases. The various approaches adopted for cloning and detection are reviewed. Information on the structure and function of the cloned gene products is presented and the techniques used to obtain high level expression in various hosts are discussed. BV

- 1521 Ratledge (G). Lipid biotechnology. A wonderland for the microbial physiologists. *Journal of the American Oil Chemists' Society* 64(12); 1987; 1647-1656

Recent trends in lipid biotechnology are reviewed under the headings (i) microorganisms; (ii) prospects for microbial oils; (iii) cost; (iv) microbial transformations; and (v) microorganisms as model system for studying lipid biochemistry. MVG

- 1522 Stumpf (PK). Plant lipid biotechnology through the looking glass. *Journal of the American Oil Chemists' Society* 64(12); 1987; 1641-1646
- 1523 Yamane (T). Enzyme technology for the lipid industry: An engineering overview. *Journal of the American Oil Chemists' Society* 64(12); 1987; 1657-1662

Recent trends in biochemical and biotechnological studies on the enzymes like lipases, phosphatases and lipoxygenases and R and D in both academic and industrial sectors of Japan are discussed. Some engineering aspects in the industrial applications of these enzymes are also discussed. MVG

TISSUE CULTURE

Nil

FOOD ADDITIVES

- 1524 Taylor (SL) and Bush (RK). Sulphites as food ingredients. *Food Technology in Australia* 39(11); 1987; 532-536

Discusses sulphiting agents, sulphite containing foods, use of sulphites in foods, fate of sulphites added to foods, sulphite residues in foods, sulphites hazards (asthmatic population) and regulation of sulphites. BV

Colourants

- 1525 Rush (S). Colour by numbers. *Food Technology in New Zealand* 22(9); 1987; 38-39, 41

Properties of food colours, synthetic food colours, toxicology and purity of food colours, effect of food processing, aluminium lakes as synthetic food colour and physical properties are the aspects discussed. BV

- 1526 Side (C). Natural colours. *Food Trade Review* 57(10); 1987; 541-542, 544

This article illustrates the way in which natural colours differ from artificial ones and shows how they may be obtained for use in foods. Differences between natural and artificial colours - intensity, method of case, light intensity, cost, chemical differences between natural and artificial colours, how natural dyes produce colour, how artificial dyes produce colour, source of natural colours, availability of natural colours for use in food and future of natural colours are the aspects discussed. BV

Flavourings

Vanilla

- 1527 McCormick (R). Vanilla and vanillin remain ever-versatile ingredients. Prepared Foods 157(2); 1987; 123-124

Preservatives

Nisin

- 1528 Eapen (KC), Mohan (MS), Thangamani Sankaran (R). The application of nisin lowering the process value of some canned Indian dishes. Indian Food Packer 42(2); 1988; 15-18

The Indian dishes like avail (a curry preparation with curd, coconut and vegetables having a pH of 4.0-4.2), idli (a fermented steam cooked product containing ground rice and black gram with a pH of 4.2-4.5), vegetable stew (a mildly spiced curry preparation containing vegetables with a pH of 4.7-5.0) and kheer (a preparation containing rice, milk and sugar with a pH of 6.3-6.5), were processed to different temp. after adding nisin followed by inoculation with *Bacillus stearothermophilus* NCA 1518. The results indicate that the level of nisin (I.U./g) to be used and the processing time (min) for different dishes is as follows: Avail 10 and 15, idli, 200 and 15, vegetable stew 1200 and 10 and kheer 400 and 6. This will result in considerable saving of energy by way of reduction in process time from 60 to 15 min for avail and idli and from 20 to 10 min for vegetable stew and kheer. VKR

Stabilizers

- 1529 Parker (NS). Properties and functions of stabilizing agents in food emulsions. CRC Critical Reviews in Food Science and Nutrition 25(4); 1987; 285-315

Outlines the state of knowledge concerning the basic processes which underlie the behaviour of food stabilizing agents in practical applications. The stability of emulsions is discussed in terms of the forces acting between macroscopic colloidal particles. Aspects covered include emulsion stability - forces between two droplets, emulsion breakdown, experimental approaches (emulsifying capacity, emulsifying activity) adsorption at interfaces, food emulsifiers (monoglycerides, phospholipids, fatty acids and their esters) proteins, mixed emulsifiers; emulsion formation; and problems. 117 references. BV

- 1530 Vincent (A) and Harrison (S). Stabilising dressings and sauces. Food Trade Review 57(10); 1987; 527-528, 531

Gels

- 1531 Oakenfull (D). Gelling agents. CRC Critical Reviews in Food Science and Nutrition 26(1); 1987; 1-25

New methods for studying food gels are reviewed: Molecular networks in food gels (rheological properties and interactions of the gel-forming polymers with water); recent developments in methods for studying gels (shear modulus and the theory of rubber elasticity, NMR, light scattering, kinetics); specific gel forming systems (carrageenans, alginates, pectins, starch, gelatin, and globular proteins) and mixed gelling systems. 124 references. BV

Gelatin

- 1532 Kaneko (S), Okitani (A), Hayase (F) and Kato (H). Chemical modification of gelatin with vapourised hexanal. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi)' 35(4); 1988; 271-277

Changes in chemical and functional properties of gelatin were investigated on reaction with vapourised hexanal to reveal the reaction mechanism between oxidized lipids and proteins. At lower chemical modification (4-27%) both solubility and emulsification increased. BHS

Gums

Guar gums

- 1533 Collins (TFX), Welsh (JJ), Black (TN), Graham (SL) and O'Donnell (MWJr). Study of the teratogenic potential of guar gum. *Food and Chemical Toxicology* 25(11); 1987; 807-814

Guar gum in the diet at 0, 1, 2, 4, 7.5 or 15% was available ad lib. to male and female Osborne-Mendel rats for 13 wk before mating, during mating and throughout gestation. During gestation, the females consumed 0, 0.7, 1.4, 2.7, 5.2 or 11.8 g guar gum/kg of body wt/day, resp. The animals were killed on gestation day 20. No behavioural effects were seen in any of the treated dams, and no females died during the experiment. Pregnant females in the treated groups consumed less food than the controls during gestation days 0-20 but the decrease was significant only in the 4 and 7.5% groups and was not dose related. Ingestion of guar gum before mating did not affect fertility. In the dams fed 1-7.5% guar gum, there was no effect on the number of Corpora lutea or implantations. The dams fed 15% guar gum had slightly fewer Corpora lutea and implantations than the controls but no effect was seen on implantation efficiency in this group. The number of viable fetuses/litter was also reduced slightly but not significantly in the 15% group, but since the number of resorptions was not affected, this decrease appears to be an effect of the decreased number of Corpora lutea. There was no compound related effect on foetal development or sex distribution. No terata were seen. AS

Gum arabic

- 1534 Collins (TFX), Welsh (JJ), Black (TN), Graham (SL) and Brown (LH). Study of the teratogenic potential of gum arabic. *Food and Chemical Toxicology* 25(11); 1987; 815-821

Gum arabic in the diet at 0, 1, 2, 4, 7.5 or 15% was available ad lib. to male and female Osborne-Mendel rats during pre-mating and mating and throughout gestation. During gestation, the treated females consumed from 683 mg gum/kg body wt./day in the 1% group to 10,647 mg gum/kg/day in the 15% group. The animals were killed on gestation day 20. There were no dose-related changes in maternal findings, number of foetuses, foetal viability or external, visceral or skeletal variations. No terata were seen. AS

Pectins

- 1535 Deventer-Schriemer (WHvan) and Pilnik (W). Studies on pectin degradation. *Acta Alimentaria* 16(2); 1987; 143-153

Pectin can be degraded chemically, enzymatically and mechanically. Various depolymerized pectin preparations were prepared and some of their properties are described. Gel filtration chromatography of the degradation products shows the statistical nature of the degradation and correlates with the viscosity average mol. wt. There is a good correlation with gelling strength of the pectin preparations and it appears that breaking strength of gels is more strongly affected by degradation than elasticity. AS

CEREALS

- 1536 Sandstrom (B), Almgren (A), Kivisto (B) and Cederblad (A). Zinc absorption in humans from meals based on rye, barley, oatmeal, triticale and whole wheat. *Journal of Nutrition* 117(1); 1987; 1898-1902

The study was made by the use of extrinsic labelling with ^{65}Zn and measurement of whole body retention of the radionuclide. The diets consisted of bread or porridge made with the cereals and served with milk. Oatmeal flakes were also served without any further preparation. The absorption of zinc was negatively correlated with the phytic acid content of the meal. The conclusion was that the food preparation that decreases the phytic acid content improves zinc absorption. MVG

Oats

Oat proteins

- 1537 Ma (C-Y) and Wood (DF). Functional properties of oat proteins modified by acylation, trypsin hydrolysis or linoleate treatment. *Journal of the American Oil Chemists' Society* 64(12); 1987; 1726-1731

Triticales

- 1538 Bakhshi (AK), Saxena (AK) and Sandhu (GS). Milling characteristics and end product characteristics of some advanced triticale materials. *Indian Miller* 18(2); 1987; 27, 29, 31-35

Triticale sample after conditioning to 14% moisture was milled

in a Buhler laboratory mill. The recoveries of straight grade flour was 45.1 to 70.6% which was much lower than bread wheat. This was attributed to shrivelling present in triticale kernels. The break flour ranged from 4.2 to 13.8 compared to 9.4% in bread wheats. The reduction flours ranged from 25.4 to 60.3% as compared to 60.3% in bread wheats. Triticale dough required less time to develop and had much shorter mixing time (0.6 to 3.5 min) compared to bread wheats. Some of the triticale materials recorded double farinographic peaks pointing to relatively high stability of these lines. Tolerance index was higher for triticales. The triticale cookies had good spread, desirable surface cracking and spread and comparable thickness to bread wheat cookies. Loaf vol. (2.8 to 5.2) were less in triticales. The loaf scores (18) were lower in triticales as compared to bread wheats. It was concluded that slower mixing, shorter fermentation time and proofing schedule and higher yeast concn. gave better loaves from triticales. KAR

Wheat

Wheat flour

- 1539 Kuchroo (T). Bread flour - physical and chemical properties. Indian Miller 18(4); 1988; 33, 35, 37, 39-40

The desired properties - physical and chemical of bread flour to obtain an optimum quality bread are described with emphasis on gluten content, moisture content, water absorption, damaged starch, sedimentation value, extensibility and resistance. MVG

- 1540 Sidhu (JS), Arora (CL) and Chhibba (IM). Flour mill streams. V. Distribution of minerals. Chemie Mikrobiologie Technologie der Lebensmittel 11(4); 1988; 104-106

The distribution of important minerals (P, K, Ca, Mg, Zn, Cu, Fe and Mn) in different flour mill streams, as obtained in the pilot flour mill (capacity 20 tons/day), is presented. The concn. of macroelements (P, K, Ca and Mg) increased progressively in those streams (fourth break, third and fifth reduction flour) which originate during roller flour milling mainly from the peripheral parts of wheat kernel. The concn. of a few microelements (Zn, Fe and Mn) also followed a similar trend, except the copper which showed higher concn. in the middlings. AS

- 1541 Stevens (HH). Production of custom designed flours. Indian Miller 18(3); 1987; 5-7, 9, 11, 13

Various steps involved in the production of custom designed wheat flours have been listed. MVG

Wheat proteins

- 1542 Fioretti (A). Vital wheat gluten, a protein for the future. *Industrie Alimentari* 255(26); 1987; 1115-1118

MILLETS

- 1543 Sahu (R). Small millets as the dietary substitutes for major cereals in three tribal districts of Orissa. *Indian Journal of Nutrition and Dietetics* 24(4); 1987; 108-113

This study has been carried out to assess the popularity of millets as a whole and the demand of individual millets among the adivasis of three tribal districts of Orissa. The dietary content of five small millets has been evaluated in this investigation. Results showed that most of the tribals used millets as the staple items of their diets. Ragi, the finger millet was the most popular followed by small millet and little millet. Other small millets and the giant millet were used to a very limited extent and the pearl millet was used very rarely. The little millet was found to be the most nutritive with high carbohydrate and protein content. Need is felt to improve the quality of minor millets which could serve as the ideal staple diet for the tribal people. NGKR

Corn

- 1544 Brusewitz (GH). Corn moisture variability during drying, mixing and storage. *Journal of Agricultural Engineering Research* 38(4); 1987; 281-288

The lack of uniformity with which moisture is distributed within a grain mass is known to affect its storability. The variability in moisture content between corn kernels was determined from the single kernel frequency distribution. Because the distribution was not Gaussian, the statistical parameters skewness and kurtosis were computed and used as dependent variables. Independent parameters were the different drying methods and the time after mixing wet and dry corn. Blended corn had a moisture variation greater than unblended corn and the difference was not eliminated during 24 days of storage. Microwave drying reduced corn moisture variability below that of deep bed heated air drying. AS

- 1545 Huang (T-C), Bruechert (LJ), Hartman (TG), Rosen (RT) and Ho (C-T). Effect of lipids and carbohydrates on thermal generation of volatiles from commercial zein. *Journal of Agricultural and Food Chemistry* 35(6); 1987; 985-990

In this investigation the model systems composed of zein, regular and waxy corn starch, and corn oil were heated in an oven at 120 and 180 °C and the volatile compounds generated were analysed by GC and GC/MS. It has been seen that the Maillard reaction products and

carotenoid decomposition products increased in the presence of corn oil and these two pyrazines identified from the increased number of volatiles generated at the higher temp. were found to be 2-methyl-3(or 6)-pentylpyrazine and 2,5-dimethyl-3-pentylpyrazine and were characterised as lipid-protein-carbohydrate interaction products. NGKR

Pearl millets

- 1546 Mahajan (S) and Chauhan (BM). Phytic acid and extractable phosphorus of pearl millet flour as affected by natural lactic acid fermentation. *Journal of the Science of Food and Agriculture* 41(4); 1987; 381-386

This study was carried out to determine the effect of natural lactic acid fermentation on phytate and extractable phosphorus of pearl millet flour. It was found that fermentation at 40 and 50 C for 72 h or longer eliminated phytic acid almost completely and extractable phosphorus was more than doubled. Lower temp. (20 and 30 C) were less effective and the changes in concn. of phytic acid and extractable phosphorus may be attributed partly to phytate activity in pearl millet flour. NGKR

PULSES

- 1547 Srikantha (S) and Erdman (JWJr). Legume carotenoids. *CRC Critical Reviews in Food Science and Nutrition* 26(2); 1987; 137-155

The presence of carotenoids in foods and forage legumes is reviewed. Aspects covered include carotenoids, carotenoid measurement in legumes, carotenoid composition in edible portions of food and forage legumes (leaf carotenoids, seed carotenoids; changes occurring in carotenoid content during maturation and enzymatic degradation, germination, processing, storage); applications of carotenoids in food technology (carotenoid incorporation into soybean curd and carotene bleaching effect on breadmaking); biological availability and nutritional significance. Research areas which have been inadequately explored are identified and suggestions are made for future lines of investigation. 162 references. BV

Lupins

- 1548 Karara (HA). An efficient method for the extraction of alkaloids from bitter lupin seed. *FAT Science and Technology* 89(11); 1987; 442-446

A simple, inexpensive and quick process for debittering of whole lupin seed that does not lead to environmental pollution is described. Seeds soaked in 0.1N AcOH for 2 h then boiled in water for 0.5 h, and eventually extracted with water for 8 h following the Soxhlet principle. 95% of the alkaloids were extracted by this procedure. The debittered whole seeds have a bland taste and contain around 50% protein and 20% fat. BV

Moth beans

- 1549 Pawar (VD) and Ingle (UM). Improvement in cooking quality and protein digestibility of quick-cooking moth beans (*Phaseolus aconitifolius* Jacq.). *Indian Journal of Nutrition and Dietetics* 24(4); 1987; 102-107

OILSEEDS AND NUTS

Canola

- 1550 Diosady (LL), Tar (CG), Rubin (LJ) and Naczek (M). Scale-up of the production of glucosinolate-free canola meal. *Acta Alimentaria* 16(2); 1987; 167-179

The solvent grinding of canola seed using a semi-pilot-scale Szego mill was investigated for the production of glucosinolate-free meal. The optimum grinding and contacting conditions for canola seed suspended in methanol containing 5% water (v/v) and 10% ammonia, (w/w) were 10-20 s contact time with a solvent-to-seed ratio for grinding of 2.5. The ground slurry was diluted to a pre-selected solvent-to-seed ratio (preferably 3.3) and left undisturbed for 5-15 min, then filtered, washed and extracted with hexane. The methanol-ammonia-water solution was more effective in the extraction of glucosinolates and polyphenols on the semi-pilot-scale than in the laboratory. The treatment resulted in a meal with a glucosinolate content below the detection level of the analytical method used. The polyphenol content was reduced by 80%. The oil recovered from the hexane phase is low in phosphorus and can be considered as degummed oil. AS

Groundnuts

Groundnut proteins

- 1551 Prakash (V), Appu Rao (AG) and Rajagopal Rao (D). Modification of arachin. Effect of citrate ions - structural implications. *Journal of the American Oil Chemists' Society* 64(12); 1987; 1732-1735

The effect of the anion citrate on the subunit structure of arachin has been monitored by velocity sedimentation, viscosity and circular dichroism techniques. The results indicate that as the concn. of citrate ion increases from 25 mM to 150 mM, arachin dissociates progressively to the low mol. wt. 2S component. This dissociation is not accompanied by any conformational changes or denaturation as revealed by the far ultraviolet circular dichroic spectra and viscosity results, resp. The results are explained by direct anion binding and changes in the solvent structure. AS

Rapeseeds

Rapeseed proteins

- 1552 Thompson (LU). Reduction of phytic acid concentration in protein isolates by acylation techniques. *Journal of the American Oil Chemists' Society* 64(12); 1987; 1712-1717

Use of succinylation or acetylation to separate rapeseed and navy bean flours from phytic acid (PA) to prepare low phytate protein isolates of good functional properties is studied. The separation of PA from rapeseed protein occurred during the extraction stage, while that navy bean flour occurred at the isoelectric precipitation stage. MVG

Soybeans

- 1553 Gupta (SP) and Arora (VPS). Minimising the cost of transportation for soybean processing industry in Uttar Pradesh. *Indian Journal of Agricultural Economics* 43(1); 1988; 56-62

Soybean production data, processing capacities of different plants and the transportation cost were collected from different sources. Vogel's Approximation Method was adopted for determining the initial feasible plan to get nearer to the optimum plan as it reduces the number of iterations required to reach the optimum solution. This was followed by evaluation of various cells through the Modified Distribution Method and the programme was improved until an optimum was reached. By this it was found that it is possible to achieve an overall saving in transportation cost for processing plants to the extent of Rs. 1.02 per quintal (100 kg). KAR

- 1554 Ireland (PA), Dziedzic (SZ), Drew (MGB) and Forsyth (GA). Structure of soyasapogenol B 1. *Journal of Agricultural and Food Chemistry* 35(6); 1987; 971-973

In this study the structure of soyasapogenol B1, hitherto known as artifact of hydrolysis has been elucidated by X-ray crystallography and confirmed by mass spectrometry as 3 Beta, 22 Beta-24-trihydroxyolean-13(18)-ene. NGKR

- 1555 Sessa (DJ) and Ghanous (PE). Chemical inactivation of soybean trypsin inhibitors. *Journal of the American Oil Chemists' Society* 64(12); 1987; 1682-1687

Soy products

- 1556 Ohata (K), Shiga (H), Harada (T), Mukaiyama (M), Akaba (K) and Sato (S). Removal of oligosaccharides from textured whole soybean product (TWSP) by washing. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi') 34(8); 1987; 524-528 (Ja).

The textured whole soybean product (TWSP) has been produced by using a disk type of refiner devised by us. This product contains many useful components transferred from whole soybean as a starting material for human health and can blend well with a variety of other flavours and food materials. Oligosaccharides such as raffinose and stachyose in whole soybean have been known to cause flatulence. Oligosaccharides could be removed from TWSP by washing with water without detectable loss of protein and fat. The amounts of raffinose and stachyose decreased from 0.96% to 0.14% and from 4.9% to 0.7%, respectively, by washing with water for five minutes. TWSP was freed from the oligosaccharides by washing before drying the product, during the process of the production of this product. AS

Soy milk

- 1557 Tomar (NS) and Chauhan (GS). Determination of processing time of bottled soy milk. *Beverage & Food World* 14(4); 1987; 16-19

The heat penetration data of soy milk in soft drink bottles (7 ozs capacity) and sterilized under water in a non-agitating retort were recorded using potentiometer. The retort come-up time (CUP) and corrected retort CUP for non-agitating processing were 14 and 8.12 min resp. with an initial retort temp. 123 F. Processing time of bottled soy milk calculated by formula method was 35.7 min at 240 F. BV

Soy proteins

- 1558 Arai (S) and Kimura (H). Comparative nutritional value for amino acids, oligopeptides and soybean protein. *Journal of the American Oil Chemists' Society* 64(12); 1987; 1692-1696

Nutritional effects of supplemental peptide-bound methionine with soy protein isolate (SPI) and those oligo-peptide mixture that may be usable in alimentary diets for recovery from protein malnutrition are discussed. MVG

- 1559 Kito (M). Chemical and physical lipophilization of proteins. *Journal of the American Oil Chemists' Society* 64(12); 1987; 1676-1681

Soy glycinin and Alpha_{s1}-casein were lyophilised by chemically attaching naturally occurring fatty acids to them. There was an increase in their emulsifying activity due to the covalent attachment of fatty acid residues to these proteins. By soapinification, soy protein and maize protein, zein were resp. attached with soy lecithin and phospholipid. The emulsifying activity of phospholipid protein complexes was greatly increased after treatment with 50% ethanol or enzyme digestion. MVG

- 1560 Visser (A) and Thomas (A). Soy protein products - their processing, functionality and application aspects. *Food Reviews International* 3(1&2); 1987; 1-32

This review covers the processing - refining processes (full-fat soy flour, defatted soy flour and grit, soy protein concn. soy protein

isolate, textured soy products, spun protein isolates and other fibrous structures and modified soy proteins); functional properties of soy protein products - protein solubility, water binding, fat binding, gelling properties, emulsifying capacity, sensory properties (colour, flavour and texture) application in food products (meat, poultry and fish products; bakery products and other wheat-based products, breads, high protein products, confectionery products, chocolate products, snacks and breakfast cereals, sauces and ragouts, dairy-type products, soy-based products); nutritional values, legislation and methods of analysis. 53 references. BV

- 1561 Yamano (Y), Tamura (S) and Miki (E). Effect of melting point of palm oil on the texture of soybean protein gel. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi') 34(8); 1987; 507-512 (Ja).

The effects of melting point of palm oil on the gel formation from the soybean protein and on the texture of the gel were investigated. Hardness of the gels containing high melting point palm oils (33 and 40 °C) increased with an increase of the oil content, but that of the gel containing low melting point oil (21 °C) decreased with the oil content. Water holding capacity of all gels increased linearly proportional to oil content and the larger increasing ratio was observed for the gels containing higher melting point oil. Larger the oil content, the increasing rate of viscosity of each soy milk during heating at 50 °C was lower, but its maximum viscosity value was larger. There was no difference among the max. viscosity values of the soy milks concerning melting point of oils. Almost all oils were incorporated into gels up to the content of 15%. The electron microscopic observation revealed that oil seems to bind with protein weakly or to float in the network of protein as oil droplets of 7 to 10 µm in diameter, and that the oil droplets of the samples containing higher melting point oils appear to be smaller than those of the samples containing lower melting point oils. AS

Sunflower seeds

Sunflower proteins

- 1562 Sripad (G) and Narasinga Rao (MS). Effect of methods to remove polyphenols from sunflower meal on the physicochemical properties of the proteins. *Journal of Agricultural and Food Chemistry* 35(6); 1987; 962-967

In this investigation the proximate composition of the sunflower meal its amino acid composition, solubility, gel filtration, gel electrophoresis, sedimentation, velocity, fluorescence spectral characteristics and hydrolysis by proteases of the proteins from the extracted meal have been reported. Various solvents like 40% aqueous acetone, 40% aqueous ethanol, 40% aqueous methanol and water were used for these studies on polyphenol removal. It was seen that the efficiency of polyphenol removal was 95-98% with organic solvents whereas with water it was only 83%. The nitrogen solubility of the extracted meals was lower than that of the unextracted meal in water

in the range of pH 2-8. It was also found that the extracted meal proteins were hydrolysed to a greater extent by trypsin/Alpha-chymotrypsin/papain than the unextracted meal proteins. NGKR

TUBERS AND VEGETABLES

Root vegetables

Beet

- 1563 Considine (PJ), O'Rourke (A), Hackett (TJ) and Coughlan (MP). Hydrolysis of beet pulp polysaccharides by extracts of solid-state cultures of *Penicillium capsulatum*. *Biotechnology and Bioengineering* 31(5); 1988; 433-438

Extracts of solid-state cultures of *Penicillium capsulatum* growth on beet pulp exhibit cellulolytic, hemicellulolytic, and pectinolytic activities. Such extracts catalyzed extensive solubilization of untreated beet pulp. The effects of pH, temp. and endproducts on the saccharification process were investigated. AS

Carrots

- 1564 Simon (PW) and Wolff (XY). Carotenes in typical and dark orange carrots. *Journal of Agricultural and Food Chemistry* 35(6); 1987; 1017-1022

In this paper a method to analyse carotenes in typical and dark orange carrots has been described. The carotenes from various carrot were separated and quantified with reverse phase HPLC and their identities verified with column chromatography and TLC. The results showed that extraction of carotenes from lyophilised samples stored less than 1 month was found to be comparable to that from raw or frozen samples and saponification was not necessary. Six carotenes were routinely detected out of which Beta-carotene accounted for 44-79% whereas Beta-, Alpha- and Lambda-carotene accounted for 94-97% of total carotenes. The total carotenes ranged from 63-548 p.p.m over lines and location/years whereas the very dark orange line HCM contained more than twice as much total carotene as any other line tested in all location/years. NGKR

Sugar Beet

- 1565 Durand (A) and Chereau (D). A new pilot reactor for solid-state fermentation: Application to the protein enrichment of sugar beet pulp. *Biotechnology and Bioengineering* 31(5); 1988; 476-486

A new pilot reactor for solid-state fermentation has been used for single-cell protein production on raw sugar beet pulp with a mutant, *Trichoderma viride* T.S. This pilot plant, having a max. working capacity of one ton (ca. 200 kg dry matter) can be scaled up to

the production plant level. During the process, the protein content increases from 9 to 20-21% (on the basis of dry matter) in 48 h. A material and heat balance is presented in relation with temp. and moisture level regulation during the process. AS

Tubers

- 1566 King (SR) and Gershoff (SN). Nutritional evaluation of three underexploited Andean tubers: *Oxalis tuberosa* (Oxalidaceae), *Ullucus tuberosus* (Basellaceae), and *Tropaeolum tuberosum* (Tropaeolaceae). *Economic Botany* 41(4); 1987; 503-511

Three species of edible tubers endemic to and domesticated in the Andes were studied for their nutritional value. Collected samples of *Oxalis tuberosa*, *Ullucus tuberosus* and *Tropaeolum tuberosum* show a high amount of variation in both percent protein and quality of essential amino acids. A protein difference of 120% is present among *T. tuberosum* cvs and a protein difference of 300% is present among the three sp. BV

Cassava

Cassava starch

- 1567 Rickard (JE) and Behn (KR). Evaluation of acid and enzyme hydrolytic methods for the determination of cassava starch. *Journal of the Science of Food and Agriculture* 41(4); 1987; 373-379

This investigation was carried out to study the variation in starch values obtained using acid hydrolysis and different methods of sample preparation as compared with the more specific enzyme method of analysis. The starch contents of three cultivars of cassava were determined in cooked and uncooked samples with and without removal of alcohol soluble solids. Hydrochloric acid and amyloglucosidase methods of hydrolysis were used and the hydrolysates were analysed using glucose-specific (glucose oxidase) and non-specific (ferricyanide reduction) methods. Statistical analysis of the results obtained showed no significant differences between the methods of hydrolysis and sugar analysis. This indicated that costly enzymatic method of starch analysis appears not to be justified for starch estimation in cassava unlike other starch resources and further starch analysed in uncooked cassava by enzymic method was found to be significantly lower than for cooked sample as starch degradation varied with cultivar from 14.0 to 46.88% and as raw chips are used further research in this aspect is required. NGKR

Gari

- 1568 Ajibola (OO), Makanjuola (GA) and Almazan (AM). Effects of processing factors on the quality of gari produced by a steam gelatinization technique. *Journal of Agricultural Engineering Research* 38(4); 1987; 313-320

Gari produced by the steam gelatinization technique from 1 cm

cubes of cassava roots, fermented for 3 days, blanched for 10 min and dried at 55 °C had a total cyanide content lower than those of gari produced by the conventional technique. Cube size and blanching time significantly affected the swelling capacity of gari. BV

Potatoes

Potato starch

- 1569 Tsuji (S) and Mochizuki (Y). Researches in the multi-biting test for liquid. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi)' 34(8); 1987; 513-519 (Ja).

Researches in the multi-biting test for homogeneous and heterogeneous liquid samples were carried out. Glycerol, soluble dextrin, ethylene glycol and CMC solutions were used for homogeneous liquid samples, and the pastes of potato starch were used for heterogeneous liquid samples. In the test of homogeneous liquid, negative work load of the plunger in the multi-biting test of liquid correlated significantly to the viscosity of liquid. Ratio of the total negative work load to the total positive work load of the plunger vs the concn. of liquid showed a linear relationship within a certain range of the concn. In the case of heterogeneous liquid, positive work load of the plunger corresponded to the apparent springiness characteristics of liquid. AS

Solanum americanum

- 1570 Bobbio (PA), Bobbio (FO) and Souza (SCDe). *Solanum americanum* as a source of anthocyanins for use in foods. *Acta Alimentaria* 15(2); 1987; 155-158

From the berries of *Solanum americanum*, two anthocyanins were extracted with yields varying from 1.7 to 2.1%. The pigments were identified as malvidin-3-sophoroside-5-glucoside and malvidin-3-(di-caffeoyl-sophoroside)-5-glucoside. The unusually high amount of anthocyanins present in the berries of *S. americanum* makes this plant a potential source of natural pigments for use in foods. Stability of these anthocyanins in the conditions generally found during food processing is under study. AS

Vegetables

Bittergourd

- 1571 Kalra (CL), Berry (SK) and Kulkarni (SG). The bittergourd (*Momordica charantia* Linn) - a unique vegetable. *Indian Food Packer* 42(2); 1988; 35-45

This review article deals with cultivation and harvesting methods, physico-chemical composition of fruit and the seed, medicinal/pharmacological properties, processing technology including canning, dehydration and preparation of pickle. VKR

Brinjal

- 1572 Kalra (CL), Berry (SK) and Sehgal (RC). A resume on brinjal (*Solanum melongena* Linn) - a most common vegetable. *Indian Food Packer* 42(2); 1988; 46-59

The review covers aspects on harvesting, handling, storage, chemical composition, including carbohydrates, protein, amino acids, vitamins, pigments, phenolic compounds, enzymes and mineral matter. The processing technology of brinjals deals with canning, dehydration, pickling, freezing and development of fried products. VKR

Cucumbers

- 1573 Miller (AR), Dalmaso (JP) and Kretchman (DW). Mechanical stress, storage time, and temperature influence cell wall-degrading enzymes, firmness, and ethylene production by cucumbers. *Journal of the American Society for Horticultural Science* 112(4); 1987; 666-671

The activity of cellulose, pectin methylesterase, peroxidase, polygalacturonase and xylanase after mechanical stress and post harvest storage at given temp. was determined and the data related to visible changes within the cucumbers, ethylene production rates and tissue firmness. MVG

Leafy vegetables

- ✓ 1574 Ramana (SV), Jayaraman (KS) and Mohan Kumar (BL). Studies on the colour of some dehydrated green leafy vegetables. *Indian Food Packer* 42(2); 1988; 19-23

Effect of sun-drying (SD), solar cabinet drying (SCD) and tray drying (TD) on the colour of dehydrated fenugreek (*Trigonella foenum-graecum*) and mustard (*Brassica campestris* var. Sarson) leaves was investigated. SD showed considerable change in the hue and chlorophyll content compared to SCD and TD, in both the leaves. Drying time was higher for mustard leaves than for fenugreek leaves; lesser time was needed in TD compared to SCD or SD. Significant difference ($P = 0.01$) between the products dried by different methods were observed when evaluated for their colour attributes. It is recommended that SCD could be used to get good product in tropical regions. VKR

Tomatoes

- 1575 Baldwin (EA) and Pressey (R). Tomato polygalacturonase elicits ethylene production in tomato fruit. *Journal of the American Society for Horticultural Science* 113(1); 1988; 92-95

Fungal cell-wall lysing enzymes have been shown to induce ethylene production in different plant systems. Tomato fruit (*Lycopersicon esculentum*, Mill.) were vacuum-infiltrated with the tomato cell-wall enzymes, polygalacturonase I and II (PG I, PG II) and pectin methylesterase (PME). Fruit ethylene levels were observed to increase relative to either salt, buffer, or boiled enzyme controls.

This increase in ethylene production occurred in green 'Cherry' tomato fruit as well as in the mutants rin, nor and Cornell 111. Enzyme-induced ethylene synthesis generally peaked at or before 17 to 20 h and decreased to lower or basal levels in most immature normal cultivars by 42 h after treatment. Ethylene was maintained at high levels, however, in some (possibly more mature) green fruit, as well as in all mutant lines. PG II was more effective than PG I in inducing ethylene production and PME seemed to enhance the ethylene-inducing activity of PG II. AS

- 1576 Casas Diaz (AV), Hewitt (JD) and Lapushner (D). Effects of parthenocarp on fruit quality in tomato. *Journal of the American Society for Horticultural Science* 112(4); 1987; 634-637

Effects of genetic sources of parthenocarp on fruit quality was examined. Comparisons were made of percentage soluble solids, percent total solids, water insoluble solids, total solids ratio, pH and titratable acidity and colour. MVG

- 1577 Hall (CB). Firmness of tomato fruit tissues according to cultivar and ripeness. *Journal of the American Society for Horticultural Science* 112(4); 1987; 663-665

Firmness of pericarp wall tissues of a transverse slice of tomato was determined for several cv at various stages of ripeness. MVG

- 1578 Inaba (M) and Crandall (PG). Electrolyte leakage as an indicator of high-temperature injury to harvested mature green tomatoes. *Journal of the American Society for Horticultural Science* 113(1); 1988; 96-99

Newly harvested tomatoes are often exposed to short periods of high temp. To simulate harvest conditions, mature green (MG) tomatoes (*Lycopersicon esculentum* Mill. cv. 908) were exposed to direct solar radiation until their mean temp. became 45, 50, or 55 C. When fruit temp. were > 50 C, heat injury was obvious. Once exposed, tomatoes remained at these high temp. for =1 h, even after being transferred to shade. The interaction between high temp. and exposure time on tomato thermostability was studied in the laboratory. Critical exposure times calculated for '908' tomatoes were 34, 105, and 166 min for exposure to 55, 50, and 45, resp. For practical field applications, this high-temp. stress may decrease the quality by causing the destruction of fruit cellular tissue and physiological disorders. BAP

- 1579 Ramana (SV), Mohan Kumar (BL) and Jayaraman (KS). Extension of storage life of (*Lycopersicon esculentum* M) under ambient condition by continuous flushing of storage atmosphere. *Indian Food Packer* 42(2); 1988; 60-64

Green tomatoes (cv. Sioux) were stored under laboratory conditions at ambient temp. (23-30 C) by flushing the storage atm. continuously with air saturated with moisture. These tomatoes showed less wt. loss and slower changes in firmness, total soluble solids and external colour and as a consequence an extended shelf life of 18 days

compared to 8 days for the control. VKR

Tomato ketchup

- 1580 Ehasin (UR), Kaul (VK) and Bains (GS). Studies on the effect of processing on pulp particle size distribution in tomato juice and ketchup. *Indian Food Packer* 42(2); 1988; 65-71

Nature of pulp particles, their shape and size in the cold and hot break tomato juice of cv. (Pb. Chhuhara and Pb. Kesri) with and without homogenization as also in the ketchups was microscopically observed. Tomato juice of Pb. Kesri showed larger isodiametric cells than those of Pb. Chhuhara. Homogenization ruptured the intact cells and inhibited separation of serum from the cold break juice. Pb. Chhuhara ketchup of cold break juice showed the presence of larger cells than those of Pb. Kesri ketchup. VKR

FRUITS

- 1581 Wahid (M), Spttar (A), Neelofar (AS), Khan (I) and Ehlermann (DAE). Radiation disinfection and quality of dried fruits. *Acta Alimentaria* 16(2); 1987; 159-166

Dried apricots, dates, figs and raisins were irradiated at 0.25, 0.50, 1.00 kGy and stored for 12 months at ambient (28-40 °C) and lower temp. (20 plus or minus 2 °C). The insect infestation increased during storage and this increase was much larger at room than at lower temp. Irradiation dose of 1.00 kGy completely checked infestation in all the dried fruits throughout the storage. Treatment with 0.25 kGy and lower temp. was also effective in controlling the insect population during a storage period of 12 months. Ascorbic acid declined during storage and was reduced by radiation especially at higher doses. The results of sensory evaluation revealed higher rating for irradiated than unirradiated controls. It was concluded that radiation processing of dried fruits in combination with storage at reduced temp. is an effective method of providing the consumer with an acceptable and nutritious produce also outside the season for fresh fruits. AS

- 1582 Wills (RBH), Lim (JSK) and Greenfield (H). Composition of Australian foods. 40. Temperate fruits. *Food Technology in Australia* 39(11); 1987; 520-521, 530

Fig, grape (five cvs), mulberry, quince and strawberry were analysed. Data for water, protein, fat, sugars (glucose, fructose and sucrose), starch, dietary fibre, organic acids (malic, citric and tartaric), ash, vitamin C, thiamin, riboflavin, niacin, carotenoids (Alpha- and Beta-carotenes and cryptoxanthin), potassium, sodium, calcium, magnesium, iron, zinc, edible wt. and energy are presented. Stone fruit (apricot, cherry, nectarine, peach and plum) were also analysed for sorbitol and glucose. BV

Apples

- 1583 Bangerth (F) and Streif (J). Effect of aminoethoxyvinylglycine and low-pressure storage on the post-storage production of aroma volatiles by Golden-Delicious apples. *Journal of the Science of Food and Agriculture* 41(4); 1987; 351-360

Golden Delicious apple fruits untreated (control) or treated pre-harvest with the ethylene biosynthesis inhibitor aminoethoxyvinylglycine (AVG) were stored at 2 °C under either ambient pressure or low pressure (6.7 kPa; LPS). The production of aroma volatiles during post-storage periods at 20 °C was measured on fruits stored for 3, 5, 7 and 9 months. Aroma production of AVG- or LPS-treated fruits immediately after storage was considerably lower. However, after 14 days at 20 °C, aroma production almost reached values for control fruits (AVG fruits had to be treated with 50 µ ethylene litre⁻¹). After the longer storage this effect of a post-storage period at 20 °C declined gradually and finally was almost absent. Only a post-storage period at 2 °C in a normal atm. followed by a period at 20 °C was now able to partially revive long-stored fruits from this residual effect of AVG or LPS. It is suggested that changes in the sensitivity of fruits to ethylene are responsible for the observed decline in aroma production. AS

- 1584 Streif (J) and Bangerth (F). Production of volatile aroma substances by 'Golden Delicious' apple fruits after storage for various times in different carbon dioxide and oxygen concentration. *Journal of Horticultural Science* 63(2); 1988; 193-199

Golden Delicious apple fruits were stored for 3-9 months at 11 combinations of carbon dioxide/oxygen concn. at 1 °C. The production of volatiles by the stored fruits was measured by gas chromatography during post-storage shelf-life period at 20 °C. The reduction in the production of volatiles largely resembled the general inhibition of ripening under the various controlled atm. (CA) conditions. With increasing carbon dioxide and decreasing oxygen concn. aroma volatiles production was reduced especially if both gas treatments were simultaneously applied. After 7 or 9 months storage a complete recovery from the CA effect was not possible. Fruit stored at low oxygen recovered faster and more effectively than those stored at higher carbon dioxide concn. BAP

- 1585 Sugano (M), Nakano-Morita (M), Yoshida (K) and Imai (J). Influence of dietary apple and grape pomace on serum cholesterol level of the rat. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi)' 35(4); 1988; 242-245

The effects of dietary apple and grape pomace on serum cholesterol level were compared with those of pectin and cellulose in rats fed cholesterol-enriched diets. Male young rats were fed these dietary fiber sources at 10% level for 30 days. Pomace exhibited a potent hypocholesterolemic activity compared to cellulose, although the efficacy was lower than that of pectin. Serum glucose level tended to be lower in rats fed the pomace than in those fed cellulose.

The results indicate a usefulness of grape pomace as well as apple pomace as a dietary fiber to regulate serum cholesterol level. AS

Citrus fruits

Kumkaut

- 1586 Bawa (AS) and Saini (SPS). Studies on processing and utilization of Kumkaut (wild citrus) fruit. *Indian Food Packer* 42(2); 1988; 7-9

Investigation was done to explore the possibility of utilising Kumkaut (*Fortvilla* sp.) fruit for preparing squash from juice, pickle from peel and marmalade from whole fruit extract. The juice yield ranged from 35-42% when pressed under different methods. The ascorbic acid content of the juice was 30 mg %. The high acidity of juice (5.5%), sweet nature of peel, bitterness free juice and consumer acceptability indicate that Kumkaut has potential for processing. VKR

Lemons

- 1587 Ben-Yehoshua (S), Barak (E) and Shapiro (B). Postharvest curing at high temperatures reduces decay of individually sealed lemons, pome-los, and other citrus fruit. *Journal of the American Society for Horticultural Science* 112(4); 1987; 658-663

Curing of sealed lemons of normal and decay-prone types (*Citrus limon* L. Burm. f) and of sealed Goliath pomelo *Citrus grandis* (L.) Osbeck) inhibited postharvest decay without deleterious effects on fruit quality and prevented the development of *Penicillium digitatum* on inoculated fruit. Curing of nonsealed fruit was less effective in reducing decay than curing sealed fruit and caused prohibitive wt. loss, shrinkage, and softening. Curing of sealed and waxed 'Shamouti' and 'Valencia' oranges (*C. sinensis*), in comparison to only sealed fruit, resulted in some carbon dioxide injury of the peel and off-flavour. AS

Oranges

Tangerines

- 1588 Ketsa (S). Effects of fruit size on juice content and chemical composition of tangerine. *Journal of Horticultural Science* 63(1); 1988; 171-174

The relationship between fruit size and juice content and chemical composition of tangerine was studied. The results showed an increase in juice content and in the total soluble solids: titrable acidity ratio. There was a decline in total soluble solids and in titrable acidity with increasing fruit size but there was an inconsistent change in ascorbic acid with increasing fruit size. AS

Figs

- 1589 Altug (T). A comparison of Romer and CB methods for determination of aflatoxins in figs. *Chemie Mikrobiologie Technologie der Lebensmittel* 11(4); 1988; 97-99

Romer method was found to be more accurate and precise as well as being simpler and faster than the CB method for detn. of aflatoxins in figs. BV

Grapes

- 1590 Chittiraichelvan (R), Shikhamany (SD) and Chadha (KL). Effects of pre-harvest irrigation cut off on bunch size, ripening and quality of Anab-e-Shahi grape (*Vitis vinifera* L.). *Indian Journal of Horticulture* 44(1-2); 1987; 9-13

Irrigation was stopped 4 wk, 3 wk, 2 wk and 1 wk prior to the harvest of Anab-e-Shahi grapes and data were collected on bunch wt., berry wt., berry vol., % shattered berries, berry colour, and seed colour, soluble solids content and titratable acidity at each stage. Irrigation cut off even 4 wk before harvest did not affect the bunch size, as indicated by bunch wt., berry wt., and berry vol. Ripening process was also not affected by stoppage of irrigation as there were no changes in berry colour, seed colour, soluble solids, and titratable acidity during the developmental stages of berries 3 wk preceding harvest. Totally the fruit quality was not affected on account of water stress during the 4 wk period prior to harvest. It is concluded that irrigation to grapes plantation could be stopped 4 wk prior to harvest. KAR

- 1591 Ladania (MS) and Dhillon (BS). Studies on long term storage of Beauty Seedless grapes. *Indian Journal of Horticulture* 44(1-2); 1987; 34-40

Beauty Seedless grapes were packed in vented/unvented polyethylene/newsprint lined corrugated fibre board (CFB) cartons equipped with quarter size dual release sulphur dioxide generators at 1 plus or minus 1 °C and 85-90% RH over a period of 80 days. Observations were recorded for % wt. loss, berry shatter, decay, bleaching and berry cracking, soluble solids content, acidity and residual sulphur dioxide. Newsprint and unvented polyethylene lined packs showed more of berry shatter, decay and also wt. loss during 80 days of storage. Berries in vented polyethylene lined CFB cartons showed less bleaching, but wt. loss was more in these packs. Although soluble solids and acidity increased during storage, packaging and sulphur dioxide treatment did not influence these parameters. The residual sulphur dioxide ranged from 25 p.p.m. (showing slight bleaching injury) to 100 p.p.m. (heavy bleached berries); berries with 50-55 p.p.m. or 100 p.p.m. sulphur dioxide were totally not acceptable. It is concluded that vented polyethylene lined CFB cartons equipped with quarter size dual release sulphur dioxide generator could be used for storing grapes for 80 days under refrigerated conditions. KAR

Peaches

- 1592 von Mollendorff (LJ) and de Villiers (OT). Physiological changes associated with the development of woolliness in 'Peregrine' peaches during low-temperature storage. *Journal of Horticultural Science* 63(1); 1988; 47-51

The effects of different durations of storage and temp. on the development of woolliness in peaches (*Prunus persica* cv. Peregrine) were studied. All peaches became woolly during ripening for 12 days at 10 °C following storage at 2 °C but only 75% of those stored at -0.6 °C developed this disorder. Firmness and the respiration rate of woolly peaches decreased sharply at the onset of woolliness while peaches which subsequently became woolly had a lower ethylene content throughout the storage and ripening periods. When peaches were held for 2 days at 23 °C before storage at either temp few fruit developed symptoms of woolliness. Although the amount of extractable juice remained high in fruit stored without pre-treatment at 23 °C, the quantity fell rapidly during the ripening of peaches which became woolly. AS

Pears

- 1593 Stow (JR). The effect of cooling rate and harvest date on the storage behaviour of 'Conference' pears. *Journal of Horticultural Science* 63(1); 1988; 59-67

'Conference' pears were picked at weekly intervals and subjected to a range of cooling rates before storage in air at -1 °C. Considerable seasonal variation in the rate of softening during storage was found in response to cooling rate and harvest date but, in general, delayed harvesting reduced storage potential unless very fast cooling rates were employed. The starch-iodine staining pattern was an unreliable guide to the optimum harvesting period; firmness after storage was not related to firmness at harvest or after the initial period of fruit cooling to -1 °C. AS

CONFECTIONERY, STARCH AND SUGAR

Confectionery

- 1594 Anon. Unrefined sugars in confectionery manufacturing. *Confectionery Production* 54(1); 1988; 80

Though, sugar is an essential ingredient in confectionery, it is constantly under attack from health lobbyists putting pressure on manufacturers to alter their recipes and make their products more acceptable. The best solution lies in use of unrefined sugars, which contain significant quantities of important minerals and trace elements such as calcium, magnesium, iron, potassium, chromium and zinc which are missing from white sugar. SYR

Chocolates

- 1595 Riedel (HR). Chocolate shapes for assortments, nut and fruit filled. *Confectionery Production* 54(1); 1988; 71-73

Very thin chocolate shapes, or reliefs, which can be included in boxes of assorted chocolates are described. These shapes can incorporate finely chopped (or otherwise granulated) pieces of fruit or nut, such as orange or lemon peels, pineapple, ginger, banana, raisin, glazed cherry, hazelnut, walnut, brazilnut, almond and so on. Various mixtures of these fruits and nuts can also be devised by individual procedures. The general style of production is to take a good quality dark or milk chocolate of ample free flowing quality, typically a min. of 38% fat content such that it can coat and absorb the finely divided nut and fruit solids. SYR

Sugar

- 1596 Nabi Rahni (MA), Lubrano (GJ) and Guilbault (GG). Enzyme electrode for the determination of sucrose in food products. *Journal of Agricultural and Food Chemistry* 35(6); 1987; 1001-1004

In this study a multienzyme electrode for the detn. of sucrose in food and agricultural products has been developed where both the immobilisation and experimental parameters were optimised. When this electrode was evaluated for sucrose detn. the linear dynamic range was found to be 3.33×10^{-5} to 1.3×10^{-3} M for the initial rate method and 3.3×10^{-5} to 1.5×10^{-3} M for the steady-state method. Further the electrode was found to be very stable and to give fast response to sucrose. NGKR

- 1597 Preti (A). Sugar syrup decontamination. *Industrie Alimentari* 255(26); 1987; 1124-1128

BAKERY PRODUCTS

- 1598 Radhakrishnan (KL). Problems of baking industry with regard to raw materials. *Indian Miller* 18(3); 1987; 15, 17, 19, 21, 23,

The various problems facing baking industry regarding obtaining flours of desirable quality and steps to solve them have been discussed under the following headings: Flour standards, selection of proper mill streams, air classification of flour, strong flour, medium strength flour, soft flour, ash, moisture, maltose figure, damaged starch, amylolytic factors, total acidity, particle size, colour, rope spore count, and packing. MVG

Bread

- 1599 Sullivan (JW). Symposium on "Problems, prospects and promotion of bread industry" some comments on bread quality (Lecture). *Indian Miller* 18(2); 1987; 5-7

The aspects discussed include consumer needs, and effect of wheat flour, and processing methods, including sponge and dough, straight dough, liquid ferments or brew systems, no-time dough, continuous methods on bread quality. KAR

Cakes

- 1600 Askar (A), Abd El-Fadeel (MG), Sadek (MA), El Rakaybi (AMA) and Mostafa (GA). Studies on the production of dietetic cake using sweeteners and sugar substitute. *Deutsche Lebensmittel-Rundschau* 83(12); 1987; 389-394

The effect of adding some sweeteners and sugar substitutes to cake-batter on the quality of the resultant cake is studied. Fructose, sorbitol, xylitol, saccharin, aspartame and acesulfame-k were substituted for sucrose in the ratios of 25, 50 and 75%. Adding sweeteners, or sugar substitutes as replacement for sucrose resulted in a decrease in the quality and acceptability of the resultant cake. The decrement was insignificant when the sweeteners or sugar substitutes were used in a ratio of 25% in cake-batter. BV

Cookies

- 1601 Nishibori (S) and Kawakishi (S). Changes in baking products of cookie dough prepared from different materials. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi') 35(4); 1988; 235-241

The changes during baking of cookies based on different raw materials were investigated. The absorption max. at 281-295 nm increased with time of heating. Added sugar considered to be responsible for this change. The heating products of these baked cookies were separated by high performance liquid chromatography into ten components. Of the ten components 5-hydroxymethyl-furfural (HMF) is the main product formed during heating. BHS

- 1602 Ochi (T), Tsuchiya (K), Aoyama (M), Maruyama (T) and Niiya (I). Effects of tocopherols on qualitative stability of cookies and influence of powdered milk and egg. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi') 35(4); 1988; 259-264

Stabilities and antioxidants of Alpha and Delta-tocopherol (TOC) in cookies were investigated. (1) Both Alpha and Delta-TOC were decomposed by ca 20% during the baking process of cookies. The loss of Alpha-TOC in cookies during the storage at 25-60 °C was considerably greater than that of Delta-TOC, but the losses of Alpha- or Delta-TOC were reduced with an increase in amounts of added whole milk powder or egg. (2) In the case of the cookies added Alpha-TOC, peroxide value (PV) of lipid fraction was relatively high just after the baking. However that value decreased with an increase in added amounts of whole milk powder or egg. Then, the addition of whole milk powder or egg protected against oxidative degradation of lipids in cookies. (3)

Delta-TOC showed a remarkable effect on the cookies toward oxidation. PV of lipid fraction in the cookies was 0 just after baking, and only about 1.0 even after the storage at 40 C for 5 months. AS

MILK AND DAIRY PRODUCTS

- 1603 Buttriss (J). Diet, health and the dairy industry. *Journal of the Society of Dairy Technology* 40(3); 1987; 61-64

This is an overview of the nutritional and medical factors which may influence the cheese market. It covers the factors that are currently modifying opinions about diet and health, the response of the dairy industry and problems that might arise if extreme dietary changes are made too quickly. AS

- 1604 Fox (PF). Significance of chemistry to dairy science and technology. *Journal of the Society of Dairy Technology* 41(1); 1988; 17-21

A general interest paper highlighting the significance of chemistry to dairy science and technology. The four classical divisions of chemistry i.e. inorganic, organic, physical and analytical as well as biochemistry and chemical toxicology are represented in dairy chemistry. A few of the principal and most of the minor constituents of milk such as lactose, lipids and proteins have been very well reviewed to illustrate this point. MCV

- 1605 Jordan (KN) and Cogan (TM). Production of acetolactate by *Streptococcus diacetylactis* and *Leuconostoc* spp. *Journal of Dairy Research* 55(2); 1988; 227-238

The effects of pH, temp. and steam distillation on decarboxylation of Alpha-acetolactic acid (ALA) to diacetyl and acetoin was studied in model experiments. At temp. 50 C, relatively more diacetyl than acetoin was produced. Regardless of temp. HCl increased the production of acetoin (58 mol. of conversion at max.) and prevented the production of diacetyl. Steam distillation of ALA caused - 55 mol%/h conversion to acetoin and 7 mol %/h to diacetyl. Production of acetoin was proportional to the ALA concn. Based on these results two methods for the quantitative measurement of ALA were developed. Only one of 17 strains of *Streptococcus diacetylactis* (*Lactococcus lactis* subsp. *lactis* biovar. *diacetylactis*, new nomenclature) and three of three strains of *Leuconostoc* spp. produced ALA. Since *Str. diacetylactis* does not produce ALA, the results supported the involvement of acetyl-CoA in diacetyl biosynthesis by *Str. diacetylactis*. However, diacetyl synthesis in *Leuconostoc* spp. may occur through oxidative decarboxylation of ALA since considerable amounts of ALA are produced by these organisms. MCV

- 1606 Timperley (DA) and Smeulders (CNM). Cleaning of dairy HTST plate heat exchangers: Optimization of the single-stage procedure. *Journal of the Society of Dairy Technology* 41(1); 1988; 4-7

Use of single stage procedure for cleaning dairy HTST plate heat-exchangers, both physically and chemically clean surfaces could be obtained in half the time taken by the two stage alkali/acid procedure. Three cleaning parameters namely, detergent conc, temp. and flow rate affecting the removal rate of milk deposits (arising out of heating raw whole milk to 72 C) from the heated surfaces of plate heat exchanger was studied. The main reduction in cleaning time was produced by small increases in the passage mean velocity of flow in the range 0.2 to 0.5 m/s. The temp. of the cleaning solution was in the range of 60 to 90 C with a constant detergent concn. and flow rate. An increase in the temp. to 75 C resulted in substantial reduction in cleaning time. Variation in detergent concn. (1.0-3.0% w/w) for which there was an optimum of 2.5% w/w produced the min. cleaning time and had the least effect on cleaning time of the parameters studied. The study should be useful in optimising the cleaning process in terms of cost, energy and time. MCV

- 1607 Wilson (LG), Bottomley (RC), Sutton (PM) and Sisk (CH). Transfer of radioactive contamination from milk to commercial dairy products. *Journal of the Society of Dairy Technology* 41(1); 1988; 10-13

The radioactive contamination that was described in U.K. after the Chernobyl accident in April 1986 provided a valuable opportunity to study the pathways of radionuclides in the human food chain. The fate of radioactive contamination resulting from fallout from the Chernobyl accident was studied with regard to transfer of radiocaesium, the major long-lived contamination from milk into a range of commercially made dairy products. The results show that the radiocaesium partitioned with the water phase and therefore butter, cream and cheese had relatively low levels of radioactivity. Ion exchange demineralisation was effective in removing radiocaesium from whey. Ultrafiltration of whey resulted in a reduction of radioactivity relative to retentate solids. To minimise the radioactivity in commercial products prepared out of contaminated milk in dairy processing operation, production should be directed towards cream and butter and cheddar-type cheeses. MCV

Milk

- 1608 Azcona (JI), Martin (R), Asensio (MA), Hernandez (PE) and Sanz (B). Heat stable proteinase from *Pseudomonas fluorescens* AH-708. Purification by affinity chromatography on cyclopeptide antibiotics. *Journal of Dairy Research* 55(2); 1988; 217-226

A heat stable extracellular proteinase from the psychrotroph *Pseudomonas fluorescens* AH-70 isolated from Spanish raw milk was purified to electrophoretic homogeneity by affinity chromatography on a gramicidin S-Sepharose-4B column. Bacitracin linked to Sepharose-4B was unable to retain any proteolytic activity, whereas the same antibiotic bound to AH-Sepharose-4B retained 25% of the total activity. The purification procedure on the gramicidin S-Sepharose-4B column was easy to perform, fast and reproducible; it resulted in a 207-fold increase in the specific activity and a yield of 41% of the original activity. The sodium dodecyl sulphate-polyacrylamide gel electrophore-

sis (SDS-PAGE) of the protein obtained from the affinity column revealed a single band that stained for protein indicating that the proteinase was homogeneous. The purified enzyme was a monomer with a mol. wt. of 33000. The enzyme hydrolysed whole casein and its fractions whereas no activity was observed against bovine serum albumin. The enzyme was a metalloproteinase. The metal ions Zn^{2+} and Co^{2+} were found to be the most effective activators. The enzyme was heat stable, having D values at 121, 135 and 150 °C of 3.8, 1.9 and 0.6 min, resp. MCV

- 1609 Barbano (DM) and Dellavalle (ME). Rapid method for determination of milk casein content by infrared analysis. *Journal of Dairy Science* 70(8); 1987; 1524-1528

Preliminary work was carried out to develop a method for detn. of milk casein content using commercially available infrared milk testing equipment. The method is faster than the chemical method and its repeatability was comparable with the chemical method. MVG

- 1610 Des Raj and Roy (MK). Preservation of milk by gamma-irradiation. *Journal of Nuclear and Agriculture Biology* 16(4); 1987; 227-229

The titratable acidity, the index of keeping quality of milk decreased with increase in the radiation dosage (10 to 100 krad). The effect of radiation increased by lowering the temp. of storage and thus improving its shelf life. At room temp. the irradiation doses of 10, 50, 100 and 200 krad increased the shelf life by about 2, 4, 7 and 8 h resp. At 20 °C, the doses of 100 and 200 krad increased the shelf life of milk by about 18 and 22 h, resp. whereas at the refrigerated temp. (8 to 10 °C), the irradiation doses of 10, 50 and 100 krad preserved the milk in good condition for 33, 120 and 120 h, resp. Irradiation at 200 krad doses, the milk developed a heated flavour and slightly whiter than control. BV

- 1611 Grufferty (MB) and Mulvihill (DM). Protein recovered from milks heated at alkaline pH values. *Journal of the Society of Dairy Technology* 40(4); 1987; 82-85

The effects of pH, heating temp. and time and subsequent recovery of protein from acid precipitation at pH 4.0, and the solubility of milk protein isolates were determined. The nature of milk protein interaction occurring on heating milk at pH 6.5 and at pH 7.5 was also studied. MVG

- 1612 Kahn (P) and Firstenberg-Eden (R). Prediction of shelf-life of pasteurized milk and other fluid dairy products in 48 hours. *Journal of Dairy Science* 70(8); 1987; 1544-1550

- 1613 Kamei (T), Sato (J), Kodama (Y), Omata (Y) and Noda (K). Application of the conductance method to detection of post-pasteurisation contamination of pasteurised milk. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi') 35(4); 1988; 226-234

Comparison of Malthus system of conductance and standard plate count system to detect the post pasteurisation contamination of pasteurised milk was studied. To determine the optimum conditions *Pseudomonas* sp. were selected as model organisms, which gave a little change in conductance. The results obtained by the Malthus system gave good agreement with the standard plate count. It was observed that 97% of positive samples could be detected within 1 h, 98% within 4 h and 99% within 9 h after 16 h of pre-incubation. BHS

- 1614 Komorowski (ES). Additive milks. *Journal of the Society of Dairy Technology* 40(4); 1987; 94-95

Over the last 10 years the range of 'milks' which dairy companies market has increased enormously. In addition to true low fat milks (i.e. skimmed milk- and semi-skimmed milk), various additive 'milks' are not available. These include low fat 'milks' with the taste of whole milk, 'milks' with added vitamins, 'milks' enriched with calcium and 'milks' low in lactose. There are even high fat 'milks', and of course flavoured milks. The equipment for making these products is outlined, as well as the quality control requirement. The relevant legislation is also considered. AS

- 1615 McCrae (I), Harding (F) and Muir (DD). Milk compositional quality - opportunities for manipulation. *Journal of the Society of Dairy Technology* 40(3); 1987; 57-58

Widespread discussion of the effects of fat in the diet and the publication of the report of the Committee on Medical Aspects of Food Policy (COMA, 1984) have created an interest in the possibilities of manipulating the fat content of milk from the dairy cow. The two most practical methods seem to be through nutrition and breeding. However, the former would be expensive and the latter would take many years. Genetic engineering techniques may produce more rapid results but would create problems of both an ethical and an economical nature. AS

- 1616 Morgan (JN), Janelin (F), Eitenmiller (RR), Barnhart (HM) and Toledo (RT). Thermal destruction of *Escherichia coli* and *Klebsiella pneumoniae* in human milk. *Journal of Food Protection* 51(2); 1988; 132-136

Kinetic parameters (D and Z values) on thermal destruction of *Escherichia coli* and *Klebsiella pneumoniae* in human milk using HTST pasteurization conditions are presented. For *E. coli* the D values have been determined at 58, 60, 62 and 64 °C. The predicted value of D at 60 °C is 31.5s, the Z value being 3.2 °C. The D values for *K. pneumoniae* were determined at 52, 56 and 58 °C. The predicted value of D at 60 °C is 1.3s and the z value is 2.8 °C. CTD

- 1617 Neaves (P), Jervis (DI) and Prentice (GA). A comparison of DEFT clump counts obtained in eight dairy laboratories receiving replicate samples of preserved raw milk. *Journal of the Society of Dairy Technology* 40(3); 1987; 53-56

In an interlaboratory trial, the Direct Epifluorescent Filter Technique (DEFT) for estimating the hygienic quality of raw milk was

Compared with the colony count method. DEFT results depended on the skill of the operator and agreed less well with colony counts made before preservation than with colony counts made at the same time as DEFT counts. The combined DEFT counts from all laboratories compared with colony counts made after preservation showed a linear correlation coeff. of +0.87; the DEFT can provide results comparable to those of the colony count.

- 1618 Nieuwenhof (FFJ) and Hoolwerf (JD). Impedimetric detection of post-pasteurization contamination of pasteurized milk. **Netherlands Milk and Dairy Journal** 41(1); 1987; 49-68

Two impedance methods for the detection of post-pasteurisation contamination in pasteurised milk have been described in this paper. The first method known as BC impedance method involves the use of a Bactometer M120 measuring conductance with selective enrichment and the second method known as EC impedance method is based on the measurement of impedance after preincubation of the milk packs for 24 h by incubation of a small amount of milk in a selective medium for another 24 h. The results with the first method were disappointing whereas the second method gave good results by detection of far more post pasteurisation contaminated samples. NGKR

- 1619 Oortwijn (H) and Venema (DF). Improvement of methods to measure milk-clotting activity of bovine rennets. **Netherlands Milk and Dairy Journal** 41(1); 1987; 93-98

The clotting activity of rennet is determined with a well defined standard of fixed strength. It has been observed that the strength of well kept chymosin powder will not change significantly. The strength obtained in comparing rennet samples of varying chymosin-pepsin ratios with a pure chymosin standard depends on the methodology, substrate, clotting, etc. The commercial rennets can be compared with the substandards by different methods. NGKR

- 1620 Paquet (D), Uriou (A), Bracquart (P) and Linden (G). Effect of refrigerated storage of milk on proteolysis: Relationship to the proteose-peptone content. **Netherlands Milk and Dairy Journal** 41(1); 1987; 81-92

The changes during the refrigerated storage of milk with reference to the role of proteinases in the production of proteose-peptone have been investigated. It was found that the increase of proteose-peptone during storage was proportional to the growth of psychrotrophs. It was also seen that this phenomenon is enhanced by inoculation of fresh milk with a *Pseudomonas* strain and it is significant for a bacterial count of 10^6 cfu/ml and stirring seems to influence this proteolysis. By electrophoresis and gel filtration that the major components of the proteose-peptone fraction tend to disappear after 3 days of storage with appearance of peptides with high electrophoretic mobility and low mol. wt. NGKR

- 1621 Prasad (C) and Balachandran (R). Pilot-scale production of concentrated sterilized milk from standardized buffalo milk. **New Zealand**

Journal of Dairy Science and Technology 22(3); 1987; 241-246

Pilot-scale manufacture of milk concn. of 25, 30 and 35% total solids from standardized buffalo milk (6.0% fat and 9.0% solids-not-fat) was investigated. A combination of stabilizers (disodium hydrogen phosphate:trisodium citrate:k-carrageenan 2:1:0.015, however, the ratio of active phosphate to citrate was 1.1:1 as both stabilizers contain water of crystallization) was added at levels of 0.05, 0.10, 0.15, 0.20, 0.25 and 0.30% of the wt. of the concn. The effect of processing steps on the pH and the heat coagulation time (HCT) was studied. Preheating and concn. reduced both the pH and the HCT. However, homogenization significantly reduced only the HCT. The greatest stability was found when the greatest quantity of stabilizer was added to the concentrated product. The 25, 30 and 35% total solids concn. could be safely batch sterilized by adding the combined stabilizer at levels of 0.05, 0.10 and 0.15%, resp. AS

- 1622 Sharaby (MA). Factors influencing the concentrations and yields of milk constituents and their interrelationships. *Journal of Dairy Research* 55(2); 1988; 171-177

Milk samples from 250 Jersey and Friesian cows were collected and used to investigate the pattern of interrelationships between fat, protein and lactose contents and to test the effects of breed, sire, parity, stage of lactation, season of calving and milking time on them. Breed and sire effects were significant for all constituents. The concn. of milk constituents from Jersey cows were significantly higher than those in milks from Friesian cows ($P < 0.01$) with the exception of lactose which was significantly higher in Friesian milk ($P < 0.01$). Milk constituents had varying responses to parity, days in milk and season of calving. For Jersey cows, none of the concn. of constituents was influenced by age, but advancement of lactation caused an increase in fat concn. probably due to the corresponding change in milk yield. Lactose concn. also increased with increase of test-day yield. However, none of the constituents was influenced by time of lactation, age of cow, milking time or yield in the case of Friesian cows. Correlation between different constituents and their regression on each other suggested antagonistic relationships. MCV

- 1623 Singh (H), Shalabi (SI), Fox (PF), Flynn (A) and Barry (A). Rennet coagulation of heated milk. Influence of pH adjustment before or after heating. *Journal of Dairy Research* 55(2); 1988; 205-215

The rennet coagulation times of infant milk formulae or fresh skim milk (milk) samples heated at temp. in the range 70-140 °C for 1-10 min decreased on acidification, usually to pH < 6.0. Heated milk samples acidified to pH 5.5 and reneutralized to pH 6.6 retained good rennet coagulability. Acidification of such milk samples before heating also reduced the adverse effect of severe heat treatment (95 °C for 1 min) on rennet coagulation. Addition of low concn. of calcium chloride to heated milks offset the adverse effects of heating. Approx. 50% of the whey protein can be incorporated into rennet gels in heated milks while retaining food coagulability and curd tension; this may be a useful technique for increasing cheese yield. MCV

- 1624 Stone (DL). A survey of raw whole milk for *Campylobacter jejuni*, *Listeria monocytogenes* and *Yersinia enterocolitica*. *New Zealand Journal of Dairy Science and Technology* 22(3); 1987; 257-264
- 1625 Tamime (AY) and Robinson (RK). Fermented milks and their future trends. Part II. Technological aspects. *Journal of Dairy Research* 55(2); 1988; 281-307

An exhaustive review covering 140 references is presented comprising of several important aspects of fermented milks such as, lactic fermentations - mesophilic and thermophilic, therapeutic products, yeast-lactic fermentations, mould-lactic fermentations, methods of starter culture production and future developments. MCV

- 1626 van de Voort (FR), Kermasha (S), Smith (JP), Mills (BL) and Ng-Kwai-Hang (F). A study of the stability of record of performance milk samples for infrared milk analysis. *Journal of Dairy Science* 70(8); 1987; 1515-1523
- 1627 van Hooydonk (ACM), de Koster (PG) and Boerrigter (IJ). The renneting properties of heated milk. *Netherlands Milk and Dairy Journal* 41(1); 1987; 3-18

In this study the renneting behaviour of heated milk to find out whether it is due to enzymatic reaction causing breakdown of casein or due to aggregation of casein micelles causing prolongation of renneting time has been investigated. The results showed that the poor renneting properties of heated milk seem to be fully related to the impaired aggregation properties of the rennet-converted casein micelles covered with denatured whey proteins. It was seen that a considerable quantity of casein turned nonsedimentable after milk has been heated at lower temp. but there was no relation found with the renneting behaviour of the milk. NGKR

- 1628 van Hooydonk (ACM) and Walstra (P). Interpretation of the kinetics of the renneting reaction in milk. *Netherlands Milk and Dairy Journal* 41(1); 1987; 19-47

Skim-milk

- 1629 Jablonka (MS), Munro (PA) and Duffy (GG). Use of light scattering techniques to study the kinetics of precipitation of mineral acid casein from skim milk. *Journal of Dairy Research* 55(2); 1988; 179-188

Two light scattering methods for monitoring the precipitation of casein from skim milk (9% w/w) with mineral acid are presented. Experiments were carried out at precipitation temp. in the range 25-53 C and precipitation pH values in the range 3.9-5.1. The initial stages of precipitation were explored using a light fibre optics system attached to a closed-loop acid/milk mixing system. The later stages of particle formation and growth were examined using a laser doppler anemometer attached to an open-pipe flow system. It was found that there was a lag initially, followed by a period of rapid particle growth. During a third phase a dynamic equilibrium between particle growth,

break-up and shrinkage was established. A model for isoelectric casein precipitation based on these observations is proposed and discussed. AS

Milk products

Cheese

- 1630 Ardo (Y) and Pettersson (H-E). Accelerated cheese ripening with heat treated cells of *Lactobacillus helveticus* and a commercial proteolytic enzyme. *Journal of Dairy Research* 55(2); 1988; 239-245

Synergic effects of proteolytic enzymes from two different microbial sources on the ripening of Swedish hard cheese were studied. When extracellular proteolytic enzymes from *Bacillus subtilis* (Neutrase) and/or heat treated cells of *Lactobacillus helveticus* (now *L. delbrueckii* subsp. *helveticus*) were added to the cheese milk, cheese ripening was accelerated; neutrase effectively hydrolysed casein to give a softer body. Addition of heat treated lactobacilli did not accelerate hydrolysis of casein, but accelerated the breakdown of peptides which increased the amount of amino acid N in the cheese and also enhanced the intensity of cheese flavour. A bitter taste which developed in cheeses with added Neutrase could be eliminated by the simultaneous addition of heat treated lactobacilli. AS

- 1631 Banks (JM) and Tamime (AY). Seasonal trends in the efficiency of recovery of milk fat and casein in cheese manufacture. *Journal of the Society of Dairy Technology* 40(3); 1987; 64-66

A study was undertaken to define the seasonal changes in the efficiency of recovery of milk fat and protein in curd during Cheddar cheese manufacture, and to examine the milk compositional factors that may contribute to these effects. Distinct seasonal trends in the efficiency of conversion of milk fat and protein to cheese were noted. Variations in the retention of milk fat in curd could be associated with seasonal changes in the casein to fat ratio of the milk. AS

- 1632 Garcia (MC), Otero (A), Garcia (ML), Garcia (MR) and Moreno (B). Species identification of Staphylococci and Micrococci isolated from ewes milk cheeses. *Journal of Dairy Research* 55(2); 1988; 269-276

Forty-five strains of staphylococci and 6 strains of micrococci isolated from pasteurised ewes' milk cheese (Manchego and Burgos varieties) were identified to species level. Three strains of staphylococci were identified as *Staphylococcus aureus*. At the routine test dilutions (RTD), two strains of *Staph. aureus* were lysed by human phages. The phage patterns found were 6/47/54/77/42E/53 (Groups III and Miscellaneous) and 79 (Group I). The other strain was lysed at 100 x RTD by phage 95 (Group Miscellaneous). This strain also produced enterotoxin A. Amongst the 42 coagulase-negative staphylococci, 8 were novobiocin-sensitive and 34 novobiocin-resistant. The novobiocin-sensitive species found were *Staph. auricularis* (5 strains), *Staph. caseolyticus* (2 strains) and *Staph. epidermidis* (1 strain). Novobiocin-resistant strains were identified as *Staph. gallinarum* (5

strains), *Staph. xylosus* (4), *Staph. saprophyticus* (9), *Staph. cohnii* (6), *Staph. sciuri* (1) and *Staph. lentus* (3). The other 6 isolates could not be identified. The primary source of these isolates may be from human and/or animal origin. Presence of these strains in ewes milk cheeses suggest accidental contamination from food handlers. Only 3 strains of micrococci were identified (*Micrococcus kristinae*, *M. varians* and *M. sedentarius*). MCV

- 1633 Garrett (NLT). The Sirocurd process for cheese manufacture. *Journal of the Society of Dairy Technology* 40(3); 1987; 68-70

- 1634 Lawrence (RC), Creamer (LK) and Gilles (J). Texture development during cheese ripening. *Journal of Dairy Science* 70(8); 1987; 1748-1760

The texture of a cheese is determined primarily by its pH and the ratio of intact casein to moisture. The texture generally changes markedly in the first 1 to 2 wk of ripening as the hydrolysis of a small fraction of Alpha_{S1} -casein by the rennet to the peptide $\text{Alpha} - \text{I}$ results in a general weakening of the casein network. The relatively slow change in texture thereafter is determined mainly by the rate of proteolysis, which in turn is controlled largely by the proportion of residual rennet and plasmin in the cheese, salt to moisture ratio, and storage temp. The rise in pH that occurs during ripening is also important in many cheese var. Cheese texture may be significantly changed by the use of coagulants other than chymosin, addition of neutral proteases, and incorporation of whey proteins. The stretching characteristics of natural cheese curd depend upon both its pH and the proportion of colloidal calcium phosphate that has been removed. Cheese containing residual coagulant loses stretchability very rapidly with age. Eye formation in Swiss type cheese is dependent upon the cheese pH at the time of transfer to the hot room. AS

- 1635 Moskowitz (GJ) and Noelck (SS). Enzyme-modified cheese technology. *Journal of Dairy Science* 70(8); 1987; 1761-1769

Enzyme-modified cheese is derived from cheese by enzymatic means. Enzymes may be added during the manufacture of cheese or after aging. An incubation period under controlled conditions is required for proper flavour development. The mechanism of flavour development in enzyme-modified cheese may be related to the curing of cheese.

- 1636 Thomas (TD). Cannibalism among bacteria found in cheese. *New Zealand Journal of Dairy Science and Technology* 22(3); 1987; 215-219

Strains of *Lactobacillus plantarum* (3), *L. casei* (2), *L. brevis* (2) and *Pediococcus pentosaceus* (4) all grew in suspensions of cheese starter bacteria (*Streptococcus cremoris* and *Strep. lactis*) that initially contained no cell-free carbon or nitrogen. The max. cell density reached was starter specific. In some suspensions about 200 starter cells were required for the doubling of one non-starter cell. It is concluded that the lactobacilli and pediococci grew on products released during the autolysis of starter cells. AS

Cheddar cheese

- 1637 Creamer (LK), Mani Iyer and Lelievre (J). Effect of various levels of rennet addition on characteristics of cheddar cheese made from ultra-filtered milk. *New Zealand Journal of Dairy Science and Technology* 22(3); 1987; 205-214

Cheddar cheese was made, using various levels of rennet addition, from milk concentrated fivefold by ultrafiltration. The residual rennet in the resultant UF cheeses was measured. The texture and flavour of the cheeses during maturation were assessed by graders and by a sensory panel. The proteolysis of the casein proteins during maturation was investigated using electrophoresis. The data showed that, when the residual rennet levels in the control and UF Cheddar cheeses were the same, the conventional Cheddar cheese underwent more rapid ripening. The same rate of maturation in the control and UF products was obtained when the latter contained about three times the residual rennet of the former. As the compositions of all the cheeses made were very similar, the lack of breakdown of the UF cheese may have been due to the inhibition of rennet activity by whey protein. AS

- 1638 Khosravi (L) and Sandine (WE). Beta-Lactamase-producing mutants of *Streptococcus cremoris*. *Journal of Dairy Science* 70(8); 1987; 1529-1543

Six strains of penicillin G and other Beta-lactamase antibiotics resistant mutants of *Streptococcus cremoris* were isolated and were used in commercial cheddar cheese manufacture after treatment with N-methyl-N-nitro-N-nitroguanidine. Penicillin resistance was due to production of Beta-lactamase. Plasmid DNA was not demonstrated in partially purified of from mutants. The mutants had normal cellular morphology but altered phage sensitivity patterns. All except one strain were able to support complete phage adsorption. Resistance was retained after 20 phages in absence of penicillin. MVG

Halloumi cheese

- 1639 Shaker (RR), Lelievre (J), Taylog (MW), Anderson (JA) and Gilles (J). Manufacture, composition and functional properties of Halloumi cheese from bovine milk. *New Zealand Journal of Dairy Science and Technology* 22(3); 1987; 181-189

Halloumi cheese was produced from cow's milk and the effects of manufacturing procedure on the composition and quality of the product were studied. The relationship between composition and the stretchability, meltability and sensory characteristics of cheese was considered. Composition of cheese after 14 days of manufacture averaged moisture in the nonfat substance (MNFS) 53.9 plus or minus 1.6%, fat in the dry matter (FDM) 43.8 plus or minus 3.0%, salt in the dry matter (S/M), 6.7 plus or minus 0.9% and pH 5.6 plus or minus 0.3. Most of the variations in composition were similar to other cheese var. Variations resulting in relatively high rates of acid development during production gave comparatively low values of product pH and calcium to solids-non-fat-non salt ratio; under such conditions,

stretchability, meltability and tenderness of cooked cheese increased markedly. Acceptability of Halloumi cheese was greatly affected by these characteristics. MVG

Ice cream

- 1640 Bray (F). Microstructure of artisan ice cream. *Industrie Alimentari* 255(26); 1987; 1129-1136

The structure of artisan ice cream was investigated by electron microscopy using the freeze-fracture technique. No significant differences have been found on microstructure of artisan ice cream and industrial ice cream. BV

- 1641 West (S). Enzyme solution to effluent problems. *Food Trade Review* 57(6); 1987; 278-279

Effluent treatment in ice cream industry with specialised enzyme preparations is described. BV

Whey

- 1642 Castaneda (R), Fernandez (G), Calo (M) and Pasqualini (A). Cryoscopic method for detection and estimation of rennet whey total solids in whole and skim milk powders. *Netherlands Milk and Dairy Journal* 41(1); 1987; 69-79

In this investigation a cryoscopic method for detection and estimation of added rennet whey total solids to whole or skim milk powder has been developed. This method has been based on the basis of rennet whey powder containing more water soluble molecules than milk powder resulting in greater freezing point depression when both solutions are compared in equal concn. A regression equation has been developed based on freezing point measurements to estimate the added whey powder in milk powder and this equation has been found to work and the limit of detection of added whey solids was found to be 2.5%. NGKR

- 1643 Farag (RS), Ghali (Y), Hewedi (MM) and Abdel Fatah (OM). Biochemical studies on whey lipid substances. *FAT Science and Technology* 89(11); 1987; 450-452

The present work was undertaken to determine the lipid materials of salted and unsalted whey as a byproduct of cheese industry. The general chemical analysis show that the salted whey contained lower amounts of lactase, proteins and lipids compared with unsalted whey. Whey lipids contained palmitic and oleic acids as the most abundant saturated and unsaturated acids, resp. The presence of salt quantitatively altered the concn. of short-chain fatty acids due to its salting out phenomenon. A wide var. of hydrocarbons was found and C₂₂, C₂₃ constituted over 75% of the total hydrocarbons. The presence of salt in whey remarkably changed the hydrocarbon profile. The most predominant phospholipid was phosphatidyl choline followed by phosphatidyl inositol. AS

- 1644 Langley (KR), Millard (D) and Evans (EW). Emulsifying capacity of whey proteins produced by ion-exchange chromatography. *Journal of Dairy Research* 55(2); 1988; 197-203

Whey protein conc. (WPC) can be extracted commercially from whey using electrodialysis, ultrafiltration or ion-exchange. The use of whey protein powders rich in Beta-lactoglobulin (Beta-LG) and Alpha-lactalbumin (Alpha-LA) as emulsifiers for corn oil was studied. At pH 7.0, the emulsifying capacity (EC) of ion-exchange fractionated whey protein powders in corn oil/water systems increased with increase in protein concn. up to 0.1% (W/V), where it was maximal. At higher concn. EC decreased because of packing effects of the oil droplets. At low protein concn. EC could be determined from linear equations involving the relative concn. of the individual proteins in the powder. The surface coverage of Beta-LG on the oil was -1 mg m^{-2} . Oil droplet size and EC were maximal at pH 4.0-6.0, corresponding to the ionic points of the proteins. MCV

- 1645 Murphy (BF) and Mulvihill (DM). Proteins recovered from acid whey/skim milk mixtures heated at alkaline pH values. *Journal of the Society of Dairy Technology* 41(1); 1988; 22-25

Skim milk and mixtures prepared by combining acid whey with skim milk at volume ratios of 2:1, 1:1, 1:2, 1:3 and 1:4 were adjusted to pH 7.5 and heated at 90 °C x 15 min. Protein was isolated from these heated samples by precipitation at pH 4.6 and it was found that 65% of the whey protein was recovered in each case. Non-recovered proteins included the proteose peptones and small quantities of Beta-lactoglobulin, Alpha-lactalbumin and bovine serum albumin. The solubility of these isolates, which contained from 10-25% whey protein, decreased to < 95% when the whey protein exceeded ~16%. Further characterization of the isolate, prepared from the 1:1 volume ratio of acid whey and skim milk, showed that ~50% of the whey protein was insoluble, bound to casein and non-functional while the other ~50% was complexed with casein and was soluble. The addition of a reducing agent suggests that sulphhydryl bonding alone is not responsible for complex formation. AS

Milk proteins

Casein

- 1646 Dalglish (DG) and Law (AJR). Sodium caseinates - composition and properties of different preparations. *Journal of the Society of Dairy Technology* 41(1); 1988; 1-4

Samples of commercially available spray-dried and roller-dried caseinates have been compared with freshly prepared caseinate from the laboratory. The chromatographic analysis showed that the commercial caseinates differed substantially from the fresh material, especially in the regions where X-casein and Alpha_{s2} casein were eluted. The fresh caseinate was more affected by the presence of calcium ions than the others, and there were also differences between the individual spray-dried caseinates in this respect. The roller-dried caseinates

were insensitive to the presence of calcium ions.

- 1647 Jordan (PJ), Kevin Lay, Ngan (N) and Rodley (GF). Casein precipitation using high pressure carbon dioxide. *New Zealand Journal of Dairy Science and Technology* 22(3); 1987; 247-256
- 1648 Mohammad (KS) and Fox (PF). Heat-induced microstructural changes in casein micelles before and after heat coagulation. *New Zealand Journal of Dairy Science and Technology* 22(3); 1987; 191-203

Some of the microstructural changes occurring in casein micelles during severe heating (130-140 °C) and after the onset of coagulation was studied to explain the mechanism of heat coagulation. MVG

- 1649 Roefs (SPFM). Structure of acid casein gels: A study of gels formed after acidification in the cold. *Netherlands Milk and Dairy Journal* 41(1); 1987; 99-101

The structure of acid casein gels made of skim milk and sodium caseinate solutions is elucidated in this review. This covers properties of different groups of casein molecules, experimental approach formation and spatial arrangement of acid casein gels, rheological properties of the gels, and spin-spin relaxation time of water protons in casein solutions as a function of pH and temp. NGKR

MEAT AND POULTRY

Meat

- 1650 Vercellotti (JR), Kuan (JW), Liu (RH), Legendre (MG), Angelo (AJSt Dupuy (HP). Analysis of volatile heteroatomic meat flavour principles by purge-and-trap/gas chromatography - mass spectrometry. *Journal of Agricultural and Food Chemistry* 35(6); 1987; 1030-1035

This paper describes the most efficient and simple method for the isolation, identification, concn. and estimation of a wide range of volatile meat flavour principles and oxidation products of meats and meat related products down to level. This method is simple and based on purge and trap/gas chromatography-mass spectrometry which was found effective for the comprehensive analysis of nitrogen, oxygen and sulphur containing volatile compounds in ground roast beef, commercial beef flavour concn. and beef meat powder. These compounds were effectively trapped in a Tenax-containing glass liner under 5 psi vacuum and the trap was then heated in an external inlet port and the volatiles were purged into a GC-MS system for identification and concn. estimation. By this method more than 50 heteroatomic, mostly cyclic compounds were identified in these samples. NGKR

Beef

- 1651 Bowling (RA), Dutson (TR), Smith (GC) and Savell (JW). Effects of cryogenic chilling on beef carcass grade, shrinkage and palatability

characteristics. *Meat Science* 21(1); 1987; 67-72

- 1652 Dobraszczyk (BJ), Atkins (AG), Jeronimidis (G) and Purslow (PP). Fracture toughness of frozen meat. *Meat Science* 21(1); 1987; 25-49

The paper presents information on investigation of fracture process in frozen meat (beef) in the light of fracture mechanics concepts, commonly used in the fracture analysis of metals, polymer and composites and their relation to structural mechanisms of failure. MVG

- 1653 Hamby (PL), Savell (JW), Acuff (GR), Vanderzant (C) and Cross (HR). Spray-chilling and carcass decontamination systems using lactic and acetic acid. *Meat Science* 21(1); 1987; 1-14

Information is presented on the effect of spray-chill and acid decontamination procedures - both single and intermittent sprays - on the microbiological and sensory properties of beef. MVG

- 1654 Rayman (K), Malik (N) and Jarvis (G). Performance of four selective media for enumerating *Staphylococcus aureus* in corned beef and in cheese. *Journal of Food Protection* 51(2); 1988; 87-88

The performance of four selective media for enumerating *Staphylococcus aureus* in artificially contaminated samples of corned beef was strain-dependent. Baird-Parker (BP), Kranep (KR), Mannitol Salt (MS) and *Staphylococcus medium* 110 (S110) performed equally well in enumerating an enterotoxin A producing strain, but KR and BP were significantly better than S110 in enumerating an enterotoxin D producing strain of *Staph. aureus*. In naturally contaminated cheese samples which abound with competing microorganisms, BP performed significantly better than the other three media. AS

Bovines

- 1655 Jalango (JW), Saul (GL) and Lawrie (RA). Observations on muscle press juice from bovine, ovine and porcine muscles. *Meat Science* 21(1); 1987; 73-76

Differences in the amounts and protein concn. of muscle press juices from fresh and frozen psoas and L. dorsi muscles of bovine, ovine and porcine origin suggest the value of species and anatomical selection for functional applications in meat products. AS

Bulls

- 1656 Hopkins (TD) and Dikeman (ME). Effects of oestradiol-17 Beta implantation on performance, carcass traits, meat sensory traits and endocrine aspects of bulls and steers. *Meat Science* 21(1); 1987; 51-65

Pork

- 1657 Neel (SW), Reagan (JO) and Mabry (JW). Effects of rapid chilling and accelerated processing on the physical and sensory characteristics of fresh pork loins. *Journal of Animal Science* 64(3); 1987; 765-773

The feasibility of utilising combinations of electrical stimulation, high temp. conditioning and rapid chilling in the development of an accelerated processing system for bone-in fresh pork lions, is reported. MVG

Meat products

Bacon

- 1658 Bharucha (KR), Cross (CK) and Rubin (LJ). Nitroxides derived from ethoxyquin and dihydroethoxyquin as potent anti-nitrosamine agents for bacon. *Journal of Agricultural and Food Chemistry* 35(6); 1987; 915-917

The synthesis of nitroxides from ethoxyquin and dihydroxyethoxyquin was tested in bacon. The procedure of Lin and Olcott followed resulted in dealkylation to give the corresponding hydroxynitroxide as a dimer which was also observed with dihydroethoxyquin. These nitroxides were shown to be the most potent antinitrosamine agents for bacon yet discovered with complete inhibition of nitrosamines at 20 p.p.m and in some instances as low as 10 p.p.m and significant reduction was also observed at 1 p.p.m. NGKR

Ham

- 1659 Cantoni (C), Cattaneo (P) and Brenna (O). A new alteration of dry ham. *Industrie Alimentari* 255(26); 1987; 1158-1160

Reports the analysis of white coating formed on dry hams surfaces chemically and by SDS polyacrylamide gel electrophoresis to determine the presence of various myofibrillar and sarcoplasmic proteins. BV

Meat proteins

- 1660 Keshri (RC) and Joshi (HB). Effect of frozen storage on meat protein. *Beverage & Food World* 14(4); 1987; 11-12

Poultry

- 1661 Anand (SK). Problems related to microbiological sampling of dressed poultry. *Poultry Guide* 25(3); 1988; 25-27

Very general article dealing with the importance of microbiological quality study, sampling technique, and contamination during processing of poultry. KAR

- 1662 Gruiz (K) and Kiss (I). Effect of ionizing radiation on the lipids in frozen poultry. Part I. Fatty acids and hydrocarbons. *Acta Alimentaria* 16(2); 1987; 111-127

Microbiological quality and lipid changes in broiler due to ionizing radiation (4K Gy dose) was studied by chromatography and spectrophotometry. Lipid content of the investigated broilers was 8.6%

deriving partly from the muscular tissue, partly from the adipose tissue of the skin. The amount of free fatty acids increased directly upon irradiation. Similar increase was noticed in untreated samples during storage. Fatty acids derived from glycerides and esters did not show any significant changes of 4 KGy radiation, whereas significant changes were noticed at 50 KGy radiation dose. Lipid products formed by irradiation were not detected. BV

- 1663 Panda (B) and Kondaiah (N). Status and prospects of poultry and poultry products. Poultry Guide 25(4); 1988; 17-23

This review paper presented at the International Food Conference (IFCON-88) Mysore, India, covers aspects like the changes taking place in poultry production, efficiency of poultry enterprise compared to other livestock sp., quality improvement in poultry and poultry products through improved technologies and the future prospects for the poultry industry. KAR

- 1664 Panda (PC). Selection of live poultry for table use. Poultry Guide 25(3); 1988; 89-93

Describes the salient feature of the live bird which one should look for while selecting a live bird for table purpose and the important features that distinguish healthy bird from diseased bird. KAR

- 1665 Salih (AM), Smith (DM), Price (JF) and Dawson (LE). Modified extraction 2-thiobarbituric acid method for measuring lipid oxidation in poultry. Poultry Science 66(9); 1987; 1483-1488

Chickens

Broilers

- 1666 Mulder (RWAW), van der Hulst (MC) and Bolder (NM). Salmonella decontamination of broiler carcasses with lactic acid, L-cysteine, and hydrogen peroxide. Poultry Science 66(9); 1987; 1555-1557

Experiments on Salmonella decontamination of broiler carcasses with lactic acid, L-cysteine, and hydrogen peroxide were performed. Treatment with lactic acid (1%) and hydrogen peroxide (5%) resulted in a 4-log cycle reduction in colony forming units of Salmonella typhimurium both with pure cultures and with artificially inoculated broiler carcasses. L-cysteine was nonbactericidal in these experiments. AS

- 1667 Thulasi (G), Prabakaran (R), James (DJ) and Jeyagopal (R). Marketing channels and price spread for broiler chicken in Madras city. Poultry Guide 25(5); 1988; 21-24

The survey conducted in Madras city by contacting 21 wholesalers, 12 retailers and 5 chain stores indicated 5 channels in the marketing of broilers in Madras city of which producer - wholesaler - retailer - consumer channel is more predominant. The producers share in the consumer's rupee are found to be 74.67%, 80% and 94.44% in the (i) producer - wholesaler - retailer - consumer, (ii) producer -

retailer/chain stores - consumer, and (iii) producer - consumer channels resp. KAR

Hens

- 1668 Oltrogge (MH) and Prusa (KJ). Sensory analysis and instron measurements of variable-power microwave-heated baking hen breasts. *Poultry Science* 66(9); 1987; 1548-1551

Effects of four microwave cooking rates on sensory characteristics and Instron measurements of baking hen breasts were studied. Cooking time increased and rates decreased as the power level decreased but cooking losses were not affected; 60% power gave the most tender meat and produced the lowest Instron compression values. Overall, instron compression values correlated significantly with sensory tenderness scores. MVG

Quails

- 1669 Mohan (B), Narahari (D) and Alfred Jaya Prasad (I). Studies on the influence of age and sex on the chemical composition of Japanese Quail (*Coturnix coturnix japonica*) meat. *Indian Journal of Poultry Science* 22(2); 1987; 182-184

Male and female birds of Japanese quails at sixth and eighth wk. of age were slaughtered and the moisture, protein, ether extractives, ash, and calorific value of the meat were determined. With the advance in the age of quail, the carcass moisture content decreased with the proportionate increase in the fat level. The carcass protein was not influenced by the age of the quail. Calorific value and ash contents were higher for the 8th wk. quail. Protein content was higher for male than for female carcass. KAR

Poultry products

Eggs

- 1670 Ball (HRJr). Functional properties of chemically modified egg white proteins. *Journal of the American Oil Chemists' Society* 64(12); 1987; 1718-1725

Egg protein modification research to date has been reviewed with the focus on the predominant chemical modification that have been applied to egg white or egg white proteins, where relation to functional properties of egg proteins is the primary concern. MVG

- 1671 Kitabatake (N) and Doi (E). Conformational change of hen egg ovalbumin during foam formation detected by 5,5'-dithiobis-(2-nitrobenzoic acid). *Journal of Agricultural and Food Chemistry* 35(6); 1987; 953-957
- 1672 Mahapatra (CM), Pandey (NK), Verma (SS), Sharma (RD) and Harpreet Singh). Effect of oil treatment on the quality of guinea fowl eggs under room and refrigeration storage. *Indian Journal of Poultry Science* 22(2); 1987; 133-137

Guinea fowl eggs were sprayed with refined groundnut oil mixed with beta hydroxy toluene (0.0125%) and stored upto 4 and 5 wk at room temp. (23.7-40 °C), and at 30-56.5% RH and upto 8 and 12 wk at refrigeration (4-5 °C) temp. resp. A decrease in sp. gr., albumen height, albumin index, Haugh unit score and yolk index and an increase in wt. loss were observed in control and oil-treated eggs with the increase in storage period. However, no consistent trend could be observed between control and oil treated eggs for any of the quality measures under both the storage conditions. KAR

- 1673 Pandey (NK) and Shyam Sunder (G). Changes in egg quality traits of quails fed on inactive dried yeast as a protein source. *Indian Journal of Poultry Science* 22(2); 1987; 101-104

Inactive dried yeast (IDY) was fed to quails at 0, 5, 10, 15 and 20% level replacing the similar levels of groundnut cake. Inclusion of IDY upto 10% level in the diet did not affect the egg wt., shape index and egg surface area, but adverse effects were observed at 15% level. Albumen and yolk indices, sp. gr. of eggs, shell thickness, shell wt., shell wt./unit surface area and shell density were not affected with different levels of IDY. Yolk colour score and % yield of yolk were increased due to IDY. KAR

Egg products

- 1674 Gockler (L), Notermans (S) and Kramer (J). Production of enterotoxins and thermonuclease by *Staphylococcus aureus* in cooked egg noodles. *International Journal of Food Microbiology* 6(2); 1988; 127-139

Production of enterotoxin A (SEA), enterotoxin C (SEC), and thermonuclease (TNase) by *Staphylococcus aureus* was determined during growth in cooked egg-noodles at different temp. (15-37 °C). Both SEA and SEC and TNase were detected when greater than or equal to 4.0×10^7 cfu/g were present. The contents of SEA, SEC, and TNase in egg-noodles mainly increased at the end of the exponential growth phase. In contrast with SEA and SEC the production of TNase always continued till the end of each experiment. Recovery rates of SEA and TNase in cooked noodles were dependent on their amounts. TNase usually is produced at all conditions which allow growth of *Staph. aureus*. Evidence of TNase was proposed for screening for staphylococcal enterotoxins (SE) in foods. But sometimes foods contain no TNase but SE. For this reason the ELISA-test which is simple and sensitive should be used for detn. of SE-production in foods. AS

Egg yolk

- 1675 Woodward (SA), Janky (DM) and Miller (ML). Composition, colour, microbiology, and emulsifying capacity of egg yolk and ova yolk processed with or without follicles. *Poultry Science* 66(9); 1987; 1479-1482

The effects of several processing procedures on the composition, microbiology and functional properties of ova yolk with follicles removed, follicles intact and strained intact follicles were studied

and compared with the properties those of egg yolk. MVG

SEAFOODS

- 1676 Pigott (GM) and Tucker (BW). Science opens new horizons for marine lipids in human nutrition. *Food Reviews International* 3(1&2); 1987; 105-138

The role of marine lipids in human nutrition, is reviewed. Aspects covered here include lipids, lipids in seafoods, health benefits from marine oils, dosage levels and recommended intake of fish oil, the role of seafood industry as related to marine lipids (fish processing, early uses of fish oils for vitamin content and industrial fish oil as a by-product of the fish meal industry); sources of marine lipids for human consumption; extracted fish oils from industrial fish and processing residue improved extraction and processing methods and refined fish oils as food supplements and components of prepared foods. 55 references. BV

- 1677 Ruello (JH). Seafood and microwaves: Some preliminary observations. *Food Technology in Australia* 39(11); 1987; 527-530

Presents basic information about the behaviour of seafood in microwave oven. BV

Fish

Hake

- 1678 Perez-Villarreal (B) and Howgate (P). Spoilage of European hake (*Merluccius merluccius*) in ice. *Journal of the Science of Food and Agriculture* 41(4); 1987; 335-350

This investigation was carried out to study the spoilage of European hake during storage in ice by sensory, microbiological and chemical methods. The changes in total volatile bases, trimethylamine and adenine nucleotide decomposition products were measured and found to correlate highly with the sensory scores. Microbiological changes were measured by total viable count at 20 C, pseudomonad count and count of hydrogen sulphide producers. The counts were found to be highly correlated with sensory score. NGKR

Mussels

- 1679 Luckas (B). Determination of saxitoxin in mussei preserves through HPLC with post-column derivatization and fluorescence detection. *Deutsche Lebensmittel-Rundschau* 83(12); 1987; 379-381 (De).

The method presented here, based on HPLC with post-column derivatization and fluorescence detection, permits selective detn. of saxitoxin in mussel preserves down to 40 mg/kg. After an extraction

and cleaning via a weakly acid cation exchanger, saxitoxin suspicious mussel extracts are first chromatographed and then oxidized with periodic acid in an alkaline solution. After the reaction solution has been slightly acidified, the fluorescence intensity of the derivatives is measured. AS

Shrimps

- 1680 Simpson (BK), Marshall (MR) and Otwell (WS). Phenoloxidase from shrimp (*Penaeus setiferus*): Purification and some properties. *Journal of Agricultural and Food Chemistry* 35(6); 1987; 918-921

In this investigation the purification and some properties of shrimp phenoloxidase have been described. The phenoloxidase also known as phenolase assumes importance as it is implicated in the browning of fruits, vegetables, shrimp and other crustaceans commonly called melanosis or black spot which is not appealing and reduces the market value of these products. This enzyme which was purified from heads of *Penaeus setiferus* by affinity chromatography and affects the oxidation of 3-4-dihydroxyphenylalanine (DOFA) and migrates as a single band in polyacrylamide gels with mol. wt. of 30000. By this procedure 66 fold purification was obtained with an yield of 9%. This enzyme was found to be stable at pH 8.0 but very unstable at acid pH and is heat stable upto 50 C but was rapidly inactivated by 30 min incubation at 60 C and higher temp. NGKR

PROTEIN FOODS

Nil

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Alcoholic beverages

Wines

- 1681 Tredoux (HG), Kock (JLF), Lategan (PM) and Muller (HB). A rapid identification technique to differentiate between *Saccharomyces cerevisiae* strains and other yeast species in the wine industry. *American Journal of Enology and Viticulture* 38(2); 1987; 161-164
- 1682 Cattaruzza (A), Peri (C) and Rossi (M). Ultrafiltration and deep-bed filtration of a red wine: Comparative experiments. *American Journal of Enology and Viticulture* 38(2); 1987; 139-142

This study compares the effects of ultrafiltration (UF) and deep-bed filtration through sterilizing filter sheets on the composition and stability of a red wine. UF reduces by ca 70% the total colloids content of wine, while filtration through filter sheets has almost no such effect. UF also reduces by 20% the total phenolics con-

tent, which filter sheets reduce by only 10%. In spite of these differences, the UF permeate and the filter sheets filtrate are very similar in clarity and in stability to an accelerated maderization test. AS

- 1683 Durr (F) and Bloeck (S). Behaviour of white wine in small bottles and aluminum cans. *Deutsche Lebensmittel-Rundschau* 83(12); 1987; 385-389 (De).

The behaviour of white wines in small bottles and aluminium cans is studied with respect to oxidation, sensory properties, and metal contents. Wines in small bottles showed marked oxidation due to the large headspace, but no significant changes were noticed in faultlessly enamelled aluminium cans. Insufficient enamel-protected or corroded cans will quickly produce rotten-egg odour and spoiled wines. BV

- 1684 Jindra (JA) and Gallander (JF). Effect of American and French oak barrels on the phenolic composition and sensory quality of Seyval Blanc wines. *American Journal of Enology and Viticulture* 38(2); 1987; 133-138

Seyval Blanc wine was aged in new American Nevers and Limousin oak barrels to measure differences in individual free phenolic acids during a time period of 12 wks. HPLC separated at least 33 different compounds from ethanol extracts of wine. Six were tentatively identified and quantified. Aging resulted in an increase in gallic acid for all oak aged wines. The increase in gallic acid represented 7% of the total increase in nonflavonoid phenols. The results suggested that aging in different types of oak affects primarily the quantitative aspect of the wine for those compounds having absorbance at 280 nm. The free phenolic acids under study appeared to have little effect on differences in sensory quality of oak-aged wines. AS

- 1685 Liu (J-WR), Gallander (JF) and Wilker (KL). Effect of juice clarification on the composition and quality of Eastern US table wines. *American Journal of Enology and Viticulture* 38(2); 1987; 147-150

- 1686 Noble (AC), Arnold (RA), Beuchsenstein (J), Leach (EJ), Schmidt (JO) and Stern (PM). Modification of a standardized system of wine aroma terminology. *American Journal of Enology and Viticulture* 38(2); 1987; 143-146

- 1687 Ough (CS). Use of PET bottles for wine. *American Journal of Enology and Viticulture* 38(2); 1987; 100-104

- 1688 Rapp (A), Markowetz (A), Spraul (M) and Humpfer (E). Using ¹³C-NMR spectroscopy in wine analytics. *Deutsche Lebensmittel-Rundschau* 83(12); 1987; 375-378 (De).

The paper describes the detn. of wine ingredient substances (glucose, fructose, ethanol, glycerol, diethylene glycol, methanol, malic acid, tartaric acid, lactic acid) through ¹³C-NMR spectroscopy. Without prior sample treatment, the different components can be ascer-

tained in the wine side by side and structure-specifically. AS

- 1689 Schneider (A), Gerbi (V) and Redoglia (M). A rapid HPLC method for separation and determination of major organic acids in grape musts and wines. *American Journal of Enology and Viticulture* 38(2); 1987; 151-155

An isocratic HPLC method was developed for the separation and quantitative analysis of the major carboxylic acids of grape musts and wines such as citric, tartaric, malic, lactic, and acetic acids. By using an Aminex HPX87-H, a strong cation exchange resin column eluted with dilute sulphuric acid, and monitoring with UV at 210 nm, sample preparation is reduced to simple membrane filtration for white wines or musts and to the removal of phenolic compounds employing disposable reverse phase cartridges for red wines.

Non-alcoholic beverages

- 1690 Alimulla Khan, Harbans Singh, Krishna (BR) and Bhatia (AK). Carotene enriched beverages. *Indian Food Packer* 42(2); 1988; 27-29

The carotene enriched beverages were prepared by mixing carrot juice with guava, banana, galgal, pineapple, and apple juice. Juice was extracted by the use of pectolytic enzyme. It was observed that Beta-carotene content of as low as 3.36 mg/100 g which is the min. present in the juice was enough to provide the daily recommended allowance for adult. VKR

- 1691 Stegink (LD), Wolf-Novak (LC), Filer (LJJr), Bell (EF), Ziegler (EE), Krause (WL) and Brummel (MC). Aspartame-sweetened beverage: Effect of plasma amino acid concentration in normal adults and adults heterozygous for phenylketonuria. *Journal of Nutrition* 117(11); 1987; 1989-1995

Coffee

- 1692 Clifford (M). What factors determine the intensity of coffee's sensory attributes? *Tea and Coffee Trade Journal* 159(9); 1987; 34-36

Fruit juices

Grape juices

- 1693 Sims (CA) and Morris (JR). Effects of fruit maturity and processing method on the quality of juices from French-American hybrid wine grape cultivars. *American Journal of Enology and Viticulture* 38(2); 1987; 89-94

Heating grapes to 60 °C before pressing or leaving juice and skins in contact for 24 h. before pressing produced juice with higher pH and superior colour initially. No effect on flavour by processing method was noticed. The flavour of more mature grapes were superior in flavour than of less mature grapes. Heat was detrimental to flavour or colour of juices. MVG

Grapefruit juices

- 1694 Rouseff (RL), Martin (SF) and Youtsey (CO). Quantitative survey of narirutin, naringin, hesperidin, and neohesperidin in citrus. *Journal of Agricultural and Food Chemistry* 35(6); 1987; 1027-1030

In order to detect the addition of grapefruit juice to orange juice the presence of naringin cannot be used as the sole indicator. Hence studies were undertaken to determine the narirutin, naringin, hesperidin and neohesperidin concn. in juices from 52 citrus cvs using HPLC. Results showed that neither naringin nor neohesperidin was detected in sweet orange, tangerine, tangerine like hybrids or most tangelos whereas grapefruit sour orange, and K-Early (a grape fruit like tangelo) juices all contain similar amounts of naringin and varying amounts of neohesperidin. Neohesperidin concn. can be used to differentiate grapefruit, sour orange and K-Early juices. Naringin concn. in these cvs ranged from 100-800, 150-350 and 150-200 p.p.m resp. whereas neohesperidin concn. ranged from 4-10, 100-200 and 600-950 p.p.m resp. NGKR

Orange juices

- 1695 Nicolosi-Asmundo (C), Cataldi-Lupo (CM), Campisi (S) and Russo (C). Lipids in citrus fruit juice. 1. Lipid content during orange ripening in eastern Sicily. *Journal of Agricultural and Food Chemistry* 35(6); 1987; 1023-1027

This study was carried out to evaluate the lipid variations in different var. of oranges in Sicily in relation to cvs. and maturation period. The fatty acid composition of total lipids was determined during ripening and over ripening in six orange cvs in Sicily viz. Naveline, Tarocco, Moro, Sanguinello, Ovale, Valencia. The results showed that palmitic and palmitoleic acids decreased during maturation in the early ripening cvs. while palmitic acid increased in the late ripening cvs. where as linoleic and linolenic acid levels were found to be higher in the overripe than in the ripe stage. This finding was more common in the coloured var. where the fruit juices presented unpleasant odours and taste. NGKR

Soft drinks

- 1696 Isht Preet Kaur, Vaneja (K) and Ravi Kiran. Studies on acceptability and availability of fortificants present in certain fortified food-stuffs. *Indian Food Packer* 42(2); 1988; 24-26

Limca, Campa and Goldspot, the widely consumed soft drinks in India, were fortified with 50 mg of ferric lactose (12.5 mg of iron) and 50 mg of ascorbic acid in 90 ml of drink. Organoleptic evaluation showed that the fortified drinks were highly acceptable. There was no change in the keeping quality of fortified drinks compared to the unfortified samples. VKR

- 1697 Nagaraja (N), Mukunda (MR), Fotty (VH) and Shankaranarayana (ML). A study on the consumption pattern of soft beverages in rural areas of

Mysore and Mandya districts in Karnataka. *Beverage & Food World* 14(4); 1987; 27-29

Tea

- 1698 Dev Choudhury (MN) and Bajaj (KL). Seasonal variation of water soluble sugars in tea shoot and their role in tea quality. *Two and a Bud* 33(1-2); 1986; 33-38

The concn. of water soluble sugars in tea (*Camellia sinensis* L.) shoot (terminal two leaves and growing bud) was high during May and low during early June to early July; sugar content also significantly high (1.85 and 1.73% resp. in TV 15 and TV 18) within clones than in other clones. Shoots plucked in the afternoon showed significant increase in sugar content. In the manufacturing process reducing, non-reducing and total sugars decreased significantly during withering of tea shoot; while reducing sugar content increased during fermentation at the expense of non-reducing sugars. Drying of fermented leaves caused minor increase in the reducing sugar concn. Theaflavins concn. were high during June; afterwards it fluctuated at somewhat lower levels through the remaining part of the year. Regression studies between shoot sugar and theaflavins and also between sugar and taster's score indicate linear (+ or -) and quadratic relationship (- or +) resp. KAR

- 1699 Ullah (MR). A rapid procedure for estimating theaflavins and thearubigins of black tea. *Two and a Bud* 33(1-2); 1986; 46-48

In this simplified, quick method for extraction of theaflavin the tea infusion is mixed with disodium hydrogen phosphate, and extracted with ethyl acetate by quick repeated inversion. On separation of the two phases the bottom layer was drained off and the ethyl acetate extract containing the theaflavin fraction was diluted with methyl acetate. The estimation of theaflavins and thearubigins is done spectrophotometrically which indicated a mean content of theaflavin of 1.47 plus or minus 0.02% in C.T.C. tea and 0.77 plus or minus 0.03% in Orthodox tea. The errors in repeat estimation are insignificant and these values compared well with earlier methods of estimation. KAR

FATS AND OILS

Fats

- 1700 Arens (M) and ChrGertz. Survey by a working party of the DGF, 101th Report: German standard methods for investigation of fats, fatty products and related materials, 78th Report: Analysis of fats XXV/Analysis of Fat-rich foods. III. *FAT Science and Technology* 89(11); 1987; 435-438
- 1701 Augustin (MA), Asap (T) and Heng (LK). Relationships between measurements of fat deterioration during heating and frying in RBD olein. *Journal of the American Oil Chemists' Society* 64(12); 1987; 1670-1675

Relationships between iodine value, C18.2/C16.0 ratio, polar components and dielectric constant are reported. (1) Relationships between smoke point, acid value and polar components and those between polymer content and polar components, E at 232 nm and wavelength (r) for which $E_{10\%}^{1\text{cm}} = 1$ are also discussed. (2) while the relationships between (1) were linear, those for (2) were nonlinear. MVG

Cocoa butter

- 1702 Arnoldi (A), Arnoldi (C), Baldi (O) and Griffini (A). Strecker degradation of leucine and valine in a lipidic model system. *Journal of Agricultural and Food Chemistry* 35(6); 1987; 1035-1038

In this study leucine and valine were reacted with fructose in a mixture of cocoa butter and water at different temp. It is seen that the rate of the Strecker reaction is higher in cocoa butter than in water. In the presence of cocoa butter the two amino acids appear to give some aldehyde also without sugar. It is therefore proposed that cocoa butter is included in the participation for production of flavour during the roasting of cocoa beans. NGKR

- 1703 Chaiseri (S) and Dimick (PS). Cocoa butter, its composition and properties. *Manufacturing Confectioner* 67(9); 1987; 115-122

Covers cocoa butter composition (triglycerides, mono- and diglycerides polar lipids, sterols, volatile compounds, tocopherols) cocoa butter polymorphism; hardness; factors affecting composition of cocoa butter; (temp., rainfall, sunshine, solvent extraction, genetics, period of maturation) and effect of processing (roasting, deodorization, refining). 61 references. BV

- 1704 Dimick (PS) and Manning (DM). Thermal and compositional properties of cocoa butter during static crystallization. *Journal of the American Oil Chemists' Society* 64(12); 1987; 1663-1669

Thermal characteristics and glyceride composition of cocoa butter substitute formed under static conditions were studied by differential scanning calorimetry (DSC) and HPLC. Visual characterisation of crystallites were also obtained by polarised light microscopy (PLM). Crystals were formed under controlled static conditions at 26.0, 28.0, 30, 32 and 33 °C. Preparatory technique to grow crystals were also developed. Cocoa butter was also directly crystallised from liquid oil by DSC prior to thermal assay. At each crystal formation temp. (26-33 °C), the crystallisation types grew with varying triglyceride composition. MVG

Lipids

- 1705 Kanner (J), German (JB) and Kinsella (JE). Initiation of lipid peroxidation in biological systems. *CRC Critical Reviews in Food Science and Nutrition* 25(4); 1987; 317-364

Various mechanisms by which the first lipid-free radicals are

formed in tissue are described. The first section reviews the chemistry of oxygen, followed by various possible initiating mechanisms. Some antioxidant measures are cited. BV

Fatty acids

- 1706 Kratz (G), Wozny (G) and Johannisbauer (W). Discontinuous fractionation for the separation of a multicomponent mixture. **FAT Science and Technology** 89(11); 1987; 446-449 (De).

The economics of several continuous and discontinuous fractionation processes for the separation of a mixture containing fatty acids of the carbon chain lengths C12, C14, C16 and C18 are investigated depending on the plant throughput. The calculations show, that in case of the fatty acid mixture being discussed the batch-fractionation is an economic alternative to continuous fractionation processes for throughputs of less than 500 tons per annum. For mixtures consisting of more components batch-fractionation is an attractive process even at higher throughputs. With regard to high yield and high purity of the single fractions the batch-column should be operated with constant purity in the distillate. AS

Oils

- 1707 Kaminogawa (S), Shimizu (M), Ametani (A), Lee (SW) and Kunio Yamauchi (Y). Proteolysis in structural analysis of Alpha -casein adsorbed onto oil surfaces of emulsions and improvement of the emulsifying properties of protein. **Journal of the American Oil Chemists' Society** 64(12); 1987; 1688-1691

SPICES AND CONDIMENTS

Spices

Capsicum

- 1708 Govindarajan (VS), Rajalakshmi (D) and Nagin Chand). Capsicum - production, technology, chemistry and quality. Part IV. Evaluation of quality. **CRC Critical Reviews in Food Science and Nutrition** 25(3); 1987; 185-282

This review covers capsicum spice, quality, quality range for world cuisines, functional properties for technological use (storability, ground capsicum vs. oleoresin, antimicrobial properties), and antioxidant properties, evaluation of quality (standards, quantitation of carotenoids - colour stimuli, colour evaluation, quantitation of volatiles - the aroma stimuli, odour evaluation of capsicum fruit volatiles, quantitation of capsaicinoids - the pungency stimuli, evaluation of pungency, and total quality evaluation of green chillies). 148 references. BV

Chillies

- 1709 Narasimha Rao (B) and Rama Subbaiah (K). Dissipation of monocrotophos and carbaryl in green and ripe fruits of chilli and removal of the insecticides by different processing procedures. *Indian Cocoa, Arecanut & Spices Journal* 11(2); 1987; 53-57

Monocrotophos 0.03, 0.05 and 0.07% sprays recorded deposits of 8.09, 9.77 and 12.60 p.p.m. in chilli (*Capsicum*) ripe fruits and dissipated to below FAO/WHO tolerance limit of 0.1 p.p.m. in 13.74, 14.63 and 14.68 days in respective concn. In the green fruits the initial deposits of 9.10, 11.2 and 13.34 p.p.m. dissipated to below tolerance limit in 9.36, 13.51 and 14.30 days resp. Carbaryl 0.10, 0.15 and 0.20% sprays recorded deposits of 15.63, 17.04 and 19.11 p.p.m. on ripe fruits that dissipated to below FD tolerance limit of 10 p.p.m. in 1.72, 2.03 and 2.74 days while on green fruits the initial deposits of 15.8, 1.74, 21.61 p.p.m. dissipated in 1.61, 1.85 and 2.68 days resp. For both monocrotophos and carbaryl the initial deposits and dissipation for all concn. were more faster in green fruits as compared to ripe fruits. The five processing procedures (1) washing under tap water (2) hand scrubbing of fruits under tap water (3) scrubbing in 2% salt water (4) scrubbing and washing in hot 2% salt water and (5) washing and cooking for 15 min. tested removed considerable amounts of monocrotophos and more carbaryl at all the three concn. Among the five procedures, washing the fruits and cooking for 15 min removed greater amount of insecticide deposits and residues. Among the two insecticides carbaryl could be removed more easily by all the five procedures, even one day after spraying. KAR

Onions

- 1710 Carson (JF). Chemistry and biological properties of onions and garlic. *Food Reviews International* 3(1&2); 1987; 71-103

Reviews the chemistry and biological properties of onions and garlic. Aspects covered include onion volatiles, thiosulphates from onion and garlic, the amino acid precursor of garlic flavour, sulphoxide amino acids of onion, the structure of the lachrymatory factor, peptides of onion, allium enzymes, the biosynthesis of amino acid flavour precursors in onion and garlic, measurement of onion flavour, medicinal properties of allium vegetables and onion processing. 139 references. BV

Paprika

- 1711 Pavisa (ACS), Hajdu (F), Hoschke (A), Bodnar (J) and Biacs (P). High performance liquid chromatographic control of the standard specification of ground paprika. *Acta Alimentaria* 16(2); 1987; 129-142

Classification of commercially marketed ground paprika is based worldwide on the measurement of the overall pigment content as established by spectrophotometry subsequent to organic solvent extraction. The measurable carotenoid content of ground paprika depends largely on the extracting solvent applied and the wavelength used for detn.,

thus, to avoid marketing problems it seemed expedient to study the conditions of detn. as applied in the different countries (solvent used for extraction, wavelength applied, time of extraction). Investigations were carried out by HPLC and spectrophotometry. Based on the results the use of a three-component solvent (e.g. chloroform-acetone-isopropanol, 2:1:1) is suggested for extraction instead of the pure apolar solvents generally applied. Detn. is suggested to be made in the 500 to 510 nm wavelength region. The min. extraction time was found to be 1 h. AS

SENSORY EVALUATION

- 1712 Iida (F), Kobayashi (M), Akabane (H) and Nakahama (N). The relation between rheological properties of agar gels and sulphur content, intrinsic viscosity and the melting point. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi') 35(4); 1988; 246-251

The rheological properties of agar gels were investigated using five agar samples different in primary seaweeds and preparation methods. The rupture stress and energy of the gels increased with the intrinsic viscosity of the solution and the melting point of the gels. On the contrary, it was noted that the greater sulphur content of the samples, the smaller dynamic and static modulus of the gels.

FOOD STORAGE

Nil

INFESTATION CONTROL AND PESTICIDES

Pesticides

Bioinsecticides

- 1713 Rowe (GE) and Margaritis (A). Bioprocess developments in the production of bioinsecticides by *Bacillus thuringiensis*. *CRC Critical Reviews in Biotechnology* 6(1); 1987; 87-127

Insecticides

- 1714 Patil (VB), Padalikar (SV) and Kawale (GB). Use of potassium iodate for thin-layer chromatographic detection of sulphur-containing organophosphorus insecticides. *Analyst* 112(12); 1987; 1765-1766

BIOCHEMISTRY AND NUTRITION

Biochemistry

- 1715 Hiebel (J), Ledl (F) and Severin (Th). Isolation of 4-hydroxy-2-(hydroxymethyl)-5-methyl-3(2H)-furanone from sugar amino acid reaction mixtures. *Journal of Agricultural and Food Chemistry* 35(6); 1987; 990-993

In this study the reaction compounds of glucose with amino acids extractable by acetonitrile have been analysed and in addition to the well known 2,3-dihydro-3,5, dihydroxy-6-methyl-4H-pyran-4-one (the isomeric 6), 4-hydroxy-2-(hydroxy methyl)-5-methyl-3(2H)-furanone (5) was isolated as a further main product for the first time. 5 and 6 react with primary amines (amino acids) forming pyrrolinones of structure 9 whereas the so called amino hexose reductones 8 are obtained with secondary amines. NGKR

Proteins

- 1716 Chobert (J-M), Sitohy (M) and Whitaker (JR). Specific limited hydrolysis and phosphorylation of food proteins for improvement of functional and nutritional properties. *Journal of the American Oil Chemists' Society* 64(12); 1987; 1704-1711

Changes in the properties of casein as a result of limited proteolysis and of zein as a result of phosphorylation in the absence or presence of limiting essential amino acids are reported. MVG

- 1717 Oste (RE), Miller (R), Sjostrom (H) and Noren (O). Effect of Maillard reaction products on protein digestion. Studies on pure compounds. *Journal of Agricultural and Food Chemistry* 35(6); 1987; 938-942

The studies on the effect of some pure compounds on the activities of amino peptidase N and carboxypeptidase A have been reported. It has been seen that a number of furans and pyrroles inhibited carboxypeptidase A. The strongest inhibitors had a carboxylic-acid as a substituent on the furan ring and their effects were characterised as an induced substrate inhibition. The most effective inhibitor was found to be DL-2formyl-5-(hydroxy methyl). NGKR

- 1718 Wright (DJ) and Hemmant (JW). Foaming properties of protein solutions: *Journal of the Science of Food and Agriculture* 41(4); 1987; 361-371

In this study the potential of a semimicromethod and a microconductimetric method for the study of the foaming properties of protein solutions comparing and contrasting the results with those obtained by a conventional whipping method has been discussed. The values for foam expansion and foam stability obtained by both methods correlated well with results obtained with microconductimetric method using 0.1% protein solutions. Only a few milligrams of protein seem to be required for the assessment of its foaming behaviour by the above methods. NGKR

Nutrition

- 1719 Parvathi Easwaran (P) and Geetha Dharmarajan). Nutritional status of breast fed and artificially fed infants. *Indian Journal of Nutrition and Dietetics* 24(2); 1987; 29-33

Studies are undertaken to assess the nutritional status of breast fed and artificially fed infants. The nutritional assessment of a total number of infants was done using parameters of nutritional anthropometry, infant feeding practicals morbidity pattern and blood haemoglobin levels. Eighty six % of the infants who were breast fed were found to be in the low income group whereas out of the total 20 artificially fed infants only 25% were from low income group as against 50% in high income group. It was also observed that the breast fed infants made less visits to the hospital than artificially fed infants and in all body measurements the breast fed infants surpassed the artificially fed infants while no difference between the haemoglobin levels was observed in the two groups. NGKR

TOXICOLOGY

Bacteria

Staphylococcus aureus

- 1720 Bryant (RG), Jarvis (J) and Guibert (G). Selective enterotoxin production by a *Staphylococcus aureus* strain implicated in a foodborne outbreak. *Journal of Food Protection* 51(2); 1988; 130-131

A case of food poisoning outbreak due to consumption of cheese tortellini contaminated with *Staphylococcus aureus* has been reported. Data relating to counts of *Staph. aureus* in implicated sample together with types of enterotoxins produced, phage typing, antibiotic sensitivity and biotyping of the isolate have been reported. Although isolates produced both enterotoxin A (SEA) and enterotoxin C (SEC), SEA was alone detected (0.90 ug/100 g) in samples of suspect food. The production of SEC was delayed approx. by 4 h. The study indicates selective enterotoxin production by *Staph. aureus* in suspect foods which can be misleading to investigators of the outbreak. CTD

Mycotoxins

Aflatoxins

- 1721 Moreno (MA), Ramos (MdelG), Gonzalez (A) and Suarez (G). Effect of ultraviolet light irradiation on viability and aflatoxin production by *Aspergillus parasiticus*. *Canadian Journal of Microbiology* 33(10); 1987; 927-929

The effect of ultraviolet light irradiation (254 nm) on both the viability and the aflatoxin-producing ability of the fungus *Aspergillus parasiticus* NRRL 2999, was studied. This strain showed noticeable

resistance and irradiation for more than 10 min was necessary to reduce survival to under 10%, while the white mutants were more susceptible (5 min of irradiation reduced survival to under 1%). Induction of mutants with complete loss of aflatoxigenicity was rare.

Fusarium

- 1722 Badawey (A), Sawinsky (J) and Halasz (A). Influence of substrate on mycotoxin production of *Fusarium* species. Part II. The effect of soy meal. *Acta Alimentaria* 16(2); 1987; 105-110

Fusarium sp. (*F. graminearum*, *F. moniliforme*, *F. roseum*, *F. tricinatum* and *F. semitectum*) were examined for the ability to produce zearalenone F-2 toxin on soy meal of two different moisture contents. These species were inoculated on soy meal substrates of 52% or 68% moisture content. The samples were incubated for 7 days at 20 C, for 14 days at 8-12 C. The present investigation showed no relation between growth and toxin production by *Fusarium* sp. even though the growth of *Fusarium* was abundant on soy meal substrate. The results suggests that further studies are needed to detect whether all soy meal var. show the same resistance to F-2 toxin formation. BV

Pesticide residues

- 1723 Russo (C), Lanza (CM), Tomaselli (FG) and Nicolosi-Asmundo (C). Effect of conservation methods on insecticide residues in pickled olives. *Industrie Alimentari* 255(26); 1987; 1162-1164

Results show that with sweetening of the olives in NaOH (1%), all insecticides examined are fully eliminated. BV

FOOD LAWS AND REGULATIONS

Nil

GENERAL

- 1724 Anon. Consumer trends and attitudes toward food. Implications for strategic planning. *Food Technology* 42(1); 1988; 109-130

Covers the following papers presented at the 1987 Annual meeting of the Institute of Food Technologists, Las Vegas, Nev., June 16-19. G. A. Leveille: Current attitude and behaviour trends regarding consumption of grains (110 - 111); B. C. Breidenstein: Changes in consumer attitudes toward red meat and their effect on marketing strategy (112 - 116); E. G. Hammond: Trends in fats and oils consumption and the potential effect of new technology (117 - 120); K. E. Roepken: Consumer trends in the 1980's and implications for the dairy industry (123 - 125); and T. C. Veblen: Food system trends and business strategy. (126-130). BV

- 1725 Anon. Future ingredients. Focus of OVIFT meeting. *Food Technology* 42(1); 1988; 60-64

Properties and applications of sucralose; isomalt; crystalline; maltitol; and cyclodextrins are discussed. BV

- 1726 Anon. The impact of the Hatch Act on the profession of food science. *Food Technology* 42(2); 1988; 109

Covers the following 4 papers presented at the Annual Meeting of the Institute of Food Technologists, Las Vegas, Nev., June 16-19, 1987. Liska, B. J.: The Hatch Act and funding for Food Science Research (110-112); Roy G. Arnold: Impact of the Hatch Act on research in Food Science (113-117); Gale R. Ammerman: Hatch Act-funded graduate research in Food Science and Technology (117-119); Joseph J. Jen: Impact of the Hatch Act on the food processing industry (120-122). BV

- 1727 Bhagwati Aqua Technos Pvt. Ltd. Methane generation from distillery waste. *Chemical Age of India* 38(9); 1987; 461-463

- 1728 Duxbury (DD). New products, flavours, and uses of underutilized species. *Activities Report* 39(2); 1987; 51-55

- 1729 Gibbons (L). Challenges of feeding on a deployed aircraft carrier-20,000 meals a day. *Activities Report* 39(2); 1987; 68-72

- 1730 Krik (JR). Easing the way from laboratory to market-place. *Food Technology* 42(2); 1988; 68, 70

Discusses failure of innovations before reaching the market and role of management in improving the new product or technologies chance

of commercial success. BV

- 1731 Price (TV). Seed sprout production for human consumption - A review. **Canadian Institute of Food Science and Technology Journal** 21(1); 1988; 57-65

Reviews existing literature and identifies the areas of research required to promote better production, handling, management, storage and marketing of sprouts. Economic importance, nutritive value of sprouts, principles of sprout production (seed source, seed germination, duration of seed soak and temp. of soak water, watering regime, frequency, duration and water temp., gaseous exchange, room temp. and humidity, light, hormones, growth regulators, harvest time, post-harvest treatment, post-harvest storage, packaging, bottling and canning and microbial and toxicological factors) are discussed. 77 references. BV

- 1732 Scott (VN). Safety considerations for new generation refrigerated foods. **Dairy and Food Sanitation** 8(1); 1988; 5-7

National Food Processors Association (NFPA) has made some specific recommendations relating to safety considerations for new generation of refrigerated foods. The possible abuses in the distribution chain, along with potential differences in product formulation and safety assessment by manufacturers have been indicated. NFPA recommends proper manufacturing procedures, sanitation, product formulation and safety assessment by application of HACCP during formulation and manufacture of the products. CTD

- 1733 Twomey (T). Radioactivity and its measurement in foodstuffs. **Dairy and Food Sanitation** 7(9); 1987; 452-457

Discusses the radioactivity in foodstuffs, sources of radioactivity (natural radioactivity, industrial radioactivity, weapons testing and accidents involving radioactivity) routes of radioactivity getting into food; types and level of isotopes found in food; half-life; Becquerels; sieverts; rems and curries; legislation concerning radioactive levels in food and measurement of radioactivity by food suppliers. BV

FOOD PROCESSING

- 1734 Esaka (M), Okada (K), Suzuki (K), Kubota (K) and Kawakami (H). Microwave pasteurization of starchy food. **Journal of Japanese Society of Food Science and Technology** '(Nippon Shokuhin Kogyo Gakkaishi)' 34(2); 1987; 69-76 (Ja).

The effect of microwave heating on pasteurization of rice cake, bread, rice ball and Chinese noodle was studied. The internal temp. during microwave heating was determined with chromel-alumel; thermocouple, and the surface temp. was measured with thermolabels. A polyvinylidene chloride wrap made the surface temp. uniform. Propag-

ation of mold in rice cake, bread rice ball and Chinese noodle during storage at 30 C for 20 days could be inhibited by the microwave heating for 20-40s. The temp. of samples reached 50-90 C after the heating. The rate of decrease in wt. of samples during microwave heating was below 2.0%. A polyvinylidene chloride wrap repressed the decrease in wt., and prevented the contraction and deformation of the samples. *Escherichia coli* inoculated into bread, rice ball and Chinese noodle could be completely destroyed by the microwave heating for 20-40s. *E. coli* was however, recovered even after the microwave heating for 40 S when inoculated into rice cake. A polyvinylidene chloride wrap slightly increased the effect of microwave heating on the destruction of *E. coli* inoculated into rice ball. AS

- 1735 Thomas (P). Radiation preservation of foods of plant origin. Part IV. Mushrooms, tomatoes, minor fruits and vegetables, dried fruits, and nuts. *CRC Critical Reviews in Food Science and Nutrition* 26(4); 1988; 313-358

The technological feasibility of ionizing radiation treatment for shelf life extension of fruits and vegetables is discussed. The commodities include mushrooms, tomatoes, pineapples, lychees, longans, rambutans, mangostenes, guavas, sapotas, loquats, ber, soursops, passion fruits, persimmons, figs, melons, cucumbers, aubergines, globe artichokes, endives, lettuce, ginger, carrots, beetroots, turnips, olives, dates, chestnuts, almonds, pistachios, and other dried fruits and nuts. Changes induced by irradiation on metabolism, chemical constituents, and sensory properties are considered while evaluating the shelf life. Shelf life improvement of mushrooms and insect infestation in dried fruits, nuts, and certain fresh fruits appears to have immediate potential for commercial application. 194 references. BV

Extrusion

- 1736 Bhattacharya (M), Hanna (MA) and Kaufman (RE). Viscoelastic properties of extrusion-cooked plant protein mixtures. *Journal of Food Engineering* 7(1); 1988; 5-8

FOOD PACKAGING

- 1737 Anon. Controlled atmosphere packaging. *Food Trade Review* 57(11); 1987; 593-594
- 1738 Kashtock (M). Solving problems associated with new packaging. A processor's perspective. *Activities Report* 39(2); 1987; 36-39
- 1739 Page (GC). Corrosion failures of 304/316 stainless steels in the food industry. *Food Technology in New Zealand* 22(11); 1987; 23-25
- 1740 Sacks (B) and Gore (A). Gas packaging techniques and trends. *Food Technology in New Zealand* 23(1); 1988; 19-22

Covers briefly food spoilage mechanisms, gas packaging techni-

ques, system approach to gas packaging, food product considerations, storage and temp. considerations, gases and gas technology, packaging materials, modified atm. packaging, controlled atm. packaging, material permeability linked directly to metabolic category, the 'mother bag' concept, packaging equipment, vacuum flushing, straight flushing, chamber packaging equipment, and multirae rollstock vacuum/flush packaging equipment. BV

Packaging materials

Plastics

- 1741 Allen (DW), Leathard (DA) and Smith (C). Gamma-irradiation of food contact plastics. The rapid destruction of an arylphosphite antioxidant in polypropylene. *Chemistry and Industry* (24); 1987; 854-855
- 1742 Polvine (D). Current technical status of retortable plastic containers. *Activities Report* 39(2); 1987; 32-35

FOOD ENGINEERING AND EQUIPMENT

Engineering

- 1743 Horiuchi (H). Physical properties of food (Part III). *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi)' 34(2); 1987; 123-134 (Ja).
- 1744 Lind (I). Surface heat transfer in thawing by forced air convection. *Journal of Food Engineering* 7(1); 1988; 19-39

In thawing by forced air the effective surface heat transfer coeff., h_{eff} depends not only on convective sensible heat transfer but also on simultaneous mass transfer. It could be useful to distinguish a true convective surface heat transfer coeff., from h_c from h_{eff} . Methods of measuring and calculating the surface heat transfer coeff. are discussed. An equation for calculating h_{eff} is given. Experiments using a metal model have been carried out. Comparison between calculated and measured values of h_{eff} and especially of h shows good agreement. AS

- 1745 Russ (JC), Stewart (WD) and Russ (JC). The measurement of macroscopic images. *Food Technology* 42(2); 1988; 94, 96-102

This article discusses application of a software-based image analysis system. Simple applications, image processing, measurement parameters, statistical analysis, criteria for an image analysis system and other applications are discussed. BV

Computers

- 1746 Floros (JD) and Chinnan (MB). Computer graphics-assisted optimization for product and process development. *Food Technology* 42(2); 1988; 72.

74-78, 84

Computer graphics facilitate optimization of a system and provide guidelines for processing, quality control, and product development. AS

Equipments

- 1747 Beveridge (T), Harrison (JE) and McKenzie (DL). Juice extraction with the decanter centrifuge. A review. *Canadian Institute of Food Science and Technology Journal* 21(1); 1988; 43-49

The utilization of the decanter centrifuge to extract juice from fruit and vegetable material is reviewed. Advantages and disadvantages of the decanter as a juice extraction machine are discussed. BV

Chemostat

- 1748 Mihail (R) and Straja (S). An analysis of the steady states of a chemostat with applications to its design. *Biotechnology and Bioengineering* 31(1); 1988; 87-90

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

Chemistry

- 1749 McDanell (R), McLean (AEM), Hanley (AB), Heaney (RK) and Fenwick (GR). Chemical and biological properties of indole glucosinolates (glucobrassicins). A review. *Food and Chemical Toxicology* 26(1); 1988; 59-70

This review deals with the chemical and physiological properties of indole glucosinolates and their products and suggests possible areas for future research. Aspects covered include discovery of indole glucosinolates, occurrence and biosynthesis, methods of analysis, levels, breakdown, and biological effects of indole glucosinolates. BV

Chemistry (Analytical)

- 1750 Aremu (CY). Chemical estimation of iron, zinc, copper and phytic acid in selected foodstuffs. *Food Chemistry* 27(1); 1988; 77-82

Iron, zinc, copper and phytic acid were determined in a var. of Nigerian staple foodstuffs; the values ranged from 1.30 plus or minus 2.05 to 45.0 plus or minus 1.70, 1.35 plus or minus 0.17 to 6.93 plus or minus 0.61, 1.10 plus or minus 0.07 to 6.73 plus or minus 0.14, and 19.2 plus or minus 1.18 to 130 plus or minus 3.26 mg/100g dry matter

(DM), resp. The role of phytic acid in reducing the bioavailability of these elements in the typical Nigerian diet is discussed. AS

- 1751 Giam (CS) and Wong (MK). Plasticizers in food. *Journal of Food Protection* 50(9); 1987; 769-782

This review surveys the various analytical methods for analysis of plasticizers in foods. The problems and solutions involved in the analysis of foods are discussed. Common plasticizers, analytical methodology (liquid foods, solid foods), concn. of plasticizers in foods and attempts to reduce migration of plasticizers from packaging materials are covered in this review. BV

- 1752 Schwedt (G) and Hauck (M). Analyzing foodstuffs with micro-processor controlled photometer. *Deutsche Lebensmittel-Rundschau* 84(3); 1988; 82-85

Present the detn. of glucose, uric acid, cholesterol, tri-glycerides, calcium, phosphate and sulphate by means of a micro-processor controlled photometer system. The system used so far only in clinical chemistry has proved to be reliable in analyzing food as well, saving both time and costs. BV

FOOD MICROBIOLOGY AND HYGIENE

Enzymes

- 1753 Best (D). Enzymes crack the commodity barrier. *Prepared Foods* 157(1); 1988; 133-134, 138

Discusses the current developments in enzyme technology applications in the processed food area. Industrial enzyme technology can be applied to accelerate cheese ripening; preserve, and extend product shelf-life; enhance dietary fiber content and quality of foods, and in-process flavour modification. BV

Lysozymes

- 1754 Proctor (VA) and Cunningham (FE). The chemistry of lysozyme and its use as a food preservative and a pharmaceutical. *CRC Critical Reviews in Food Science and Nutrition* 26(4); 1988; 359-395

The chemistry and use of lysozyme as a food preservative and a pharmaceutical is reviewed. Discusses chemical characteristics of lysozyme, effect of heat and chemicals on lysozyme activity, effects of processing on lysozyme, sources of lysozyme, extraction and quantitation, enzyme substrate reaction of lysozymes, lysozyme complexes and effect of lysozyme on some bacterial strains, lysozyme as a preservative in food (cheese, meat, yeast, autolysis) and additives used with lysozyme. 240 references. BV

Proteases

- 1755 Gusek (TW) and Kinsell (JE). Properties and potential applications of a unique heatstable protease. *Food Technology* 42(1); 1988; 102-107

Reviews the properties of bacteria produced protease (*Thermomonospora fusca*) and commercial usefulness with its heat stability and high activity over a broad range of pH. BV

Microorganisms

- 1756 Radmore (K), Holzapfel (KH) and Luck (H). Proposed guidelines for maximum acceptable air-borne microorganism levels in dairy processing and packaging plants. *International Journal of Food Microbiology* 6(1); 1988; 91-95

From the total number of air-borne microorganisms present m^3 of air, 1.5% were found to contaminate a dairy product while being packed into a container with an opening of 100 cm if it was exposed for 60 s. This value was used to compile a proposed guideline of max. acceptable number of air-borne microorganisms/ m^3 which, if complied with, could ensure that no significant air-borne contamination of the product being packaged would take place. AS

Bacteria

- 1757 Archer (DL). Foodborne gram-negative bacteria and atherosclerosis. Is there a connection? *Journal of Food Protection* 50(9); 1987; 783-787

This paper summarises evidence linking early events in the process of atherogenesis with gram-negative bacteria, and further, discusses evidence suggesting that foodborne bacteria may gain access to lymphoid and/or general circulation with relative frequency. BV

- 1758 Langlois (BE), Harmon (RJ) and Akers (K). Use of lysostaphin and bacitracin susceptibility for routine presumptive identification of staphylococci of bovine origin. *Journal of Food Protection* 51(1); 1988; 24-28

A simple agar plate system based on susceptibility to lysostaphin and bacitracin to differentiate between staphylococci and micrococci is described. The system also uses susceptibility to novobiocin to aid in identification to species level of staphylococci. Growth from the agar plate can be used to prepare inocula for inoculation of rapid identification systems. AS

- 1759 Masai (H). Utilization of products of acetic acid bacteria in food industry. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi)' 35(2); 1988; 126-132 (Ja).

- 1760 Naito (S), Okada (V) and Sakai (T). Changes in microflora of ozone-treated cereals, grains, peas, beans and spices. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi)' 35(2); 1988; 69-77 (Ja).

Changes in microflora of ozone-treated cereals, grains, peas, beans and spices, packaged in a polyethylene pouch and stored at 10, 30 °C for 30 days were investigated. The conditions to evaluate the ozone treatment effect on various samples were: ozone concn, 0.5 - 50 p.p.m. temp. 10 °C time, 1h and flow rate of ozone-oxygen stream, 100 l/min. Results were as follows: 1) *Bacillus* and *Micrococcus* have been found to be the main microflora of cereals, grains, peas, beans and spices. The number of the main microorganisms of these samples could be decreased by a factor of $10 - 10^3$ by the ozone treatment below 50 p.p.m and further decreased during storage. 2) At 10 and 30 °C storage, a decrease of total microbial count was mainly ascribed to ozone remained in a polyethylene pouch. Cereals and grains kept ozone for relatively long period. 3) The preservation lives of cereals, peas, beans, grains and spices were extended by ozone treatments above 5, 5, 5, 0.5, and 50 p.p.m. resp. AS

Aeromonas hydrophila

- 1761 Palumbo (SA), Williams (AC), Buchanan (RL) and Phillips (JG). Thermal resistance of *Aeromonas hydrophila*. *Journal of Food Protection* 50(9); 1987; 761-764

Bacillus

- 1762 Yamamoto (M) and Horikoshi (K). Cloning and expression of an alkalophilic *Bacillus* oligo-1, 6- glucosidase gene in *Escherichia coli*. *Journal of the Japanese Society of Starch Science* '(Denpun Kogyo Gakkaishi)' 34(4); 1987; 300-303

The gene coding for an oligo-1, 6-glucosidase of alkalophilic *Bacillus* sp. F5 was cloned into the EcoRV site of pBR322 and expressed in *Escherichia coli* HB101. Plasmid pMCL, containing a 9.1 Kb EcoRV fragment, was isolated from the Alpha-glucosidase positive transformant. Genomic hybridization showed that the 9.1 Kb EcoRV fragment was derived from the chromosomal DNA of alkalophilic *Bacillus* F5. Restriction analysis showed that the oligo-1, 6-glucosidase gene was located in the 3.1Kb EcoRV-pvuII fragment. The enzyme productivity of the *E. coli* HB101 transformant carrying pMC21, which contains a 3.1 Kb fragment, was about 13 times higher than that of the DNA donor strain. AS

Clostridium botulinum

- 1763 Takeshi (K), Ando (Y) and Oguma (K). Germination of spores of *Clostridium botulinum* type G. *Journal of Food Protection* 51(1); 1988; 37-38

Germination of spores of *Clostridium botulinum* type G under various conditions of heat activation, incubation temp and min. nutrition was studied. The spores were optimally germinated in a mixture of L-cysteine + L-lactate + bicarbonate. The rate and extent of germination were greatly increased when unheated spores were heat-activated at 75 °C for 10 min before exposure to the germination medium. Max. germination was obtained at incubation temp. of 37 to 45

C within 1 h. However, germination occurred substantially even at 4°C if the incubation time was extended to 48 h. AS

Lactobacillus viridescens

- 1764 Delaquis (PJ), Caldwell (DE) and McCurdy (AR). The effect of salt on growth of attached and unattached cells of *Lactobacillus viridescens*. Canadian Institute of Food Science and Technology Journal 21(1); 1988; 106-108

The growth rates of attached and unattached cells of *Lactobacillus viridescens* were determined in a meat extract broth supplemented with 0 to 4% (w/v) NaCl. Attached growth rates were obtained by computer enhanced microscopy of cells adhering to glass flow chambers. Growth rates of unattached cells were determined by turbidity measurement in batch culture. Attached cells of *Lactobacillus viridescens* were capable of maintaining higher growth rates than unattached cells at all salt concn. The growth rate of attached cells was stimulated by 1 and 2% salt. AS

Pediococcus

- 1765 Hoover (DG), Walsh (PM), Kolaetis (KM) and Daly (MM). A bacteriocin produced by *Pediococcus* species associated with a 5.5-Megadalton plasmid. Journal of Food Protection 51(1); 1988; 29-31

Agarose gel electrophoresis of plasmid DNA and plasmid curing experiments suggested that bacteriocin activity was harbored on a plasmid of approx. 5.5 megadaltons (Mdal) in *Pediococcus acidilactici* P02, B5627 and PC, and *Pediococcus pentosaceus* MC-03. Bacteria that were sensitive to the bacteriocin included other pediococci, *Leuconostoc mesenteroides*, *Streptococcus faecalis* and *Listeria monocytogenes*. Three of the 5 serotypes of *L. monocytogenes* examined were inhibited by a variant lacking the 5.5 Mdal plasmid; however, when the plasmid was present, zones of inhibition doubled in size. AS

Staphylococcus aureus

- 1766 Bargiota (E), Rico-Munoz (E) and Davidson (PM). Lethal effect of methyl and propyl parabens as related to *Staphylococcus aureus* lipid composition. International Journal of Food Microbiology 4(3); 1987; 257-266
- 1767 Ewald (S) and Christensen (S). Detection of enterotoxin production by *Staphylococcus aureus* from aviation catering meals by the ELISA and the microslide immunodiffusion test. International Journal of Food Microbiology 5(1); 1987; 87-91
- 1768 Larocco (KA) and Martin (SE). Effects of potassium sorbate alone and in combination with sodium chloride on growth of *Staphylococcus aureus* MF-31. Journal of Food Protection 50(9); 1987; 750-752

Fungi

- 69 Reib (J). Bread agar, a new solid medium for the cultivation of moulds. *Chemie Mikrobiologie Technologie der Lebensmittel* 11(2); 1987; 60-62

The newly developed bread agar consists of bread powder: 100 g, agar-agar: 15 g and tap water: 1,000 ml. The final pH is corrected with 10% lactic acid to 5.6 plus or minus 0.1. On this medium the moulds *Aspergillus parasiticus*, *A. ochraceus*, *Penicillium expansum* and *P. roqueforti* grow faster than on malt extract agar. AS

Mushrooms

- 70 Rajarathnam (S) and Zakia Bano. *Pleurotus* mushrooms. Part IB. Pathology, in vitro and in vivo growth requirements, and world status. *CRC Critical Reviews in Food Science and Nutrition* 26(3); 1988; 242-311

Review: 362 references. BV

Yeasts

- 71 Banks (JG) and Board (RG). Some factors influencing the recovery of yeasts and moulds from chilled foods. *International Journal of Food Microbiology* 4(3); 1987; 197-206

The present work reports a range of selective media and incubation temp. to survey chilled meat and dairy products offered for retail sale to establish the extent and range of yeast contamination and the isolation regime most suited for their isolation of the 5 selective media used. Media based on oxytetracycline was the most, and those owing their selectivity to low pH were the least productive. At the concn. used in yeast isolation media, gentamicin inhibited particular organisms and Rose Bengal caused photodynamic death of yeasts. At incubation regime of 25 C for 7 days was better than 5 C for 14 days in terms of number of yeasts recovered. BV

Candida wickerhamii

- 72 St Julian (G), Freer (SN), Alexander (NJ) and Bothast (RJ). Characterization of cellobiose conversion to glucose and ethanol by immobilized *Candida wickerhamii*. *Cereal Chemistry* 65(1); 1988; 70-71

Hygiene

- 73 Mood (EW). Food safety in the skies. *Dairy and Food Sanitation* 7(9); 1987; 464-465
- 74 Reddy (NR), Roth (SM), Eigel (WN) and Pierson (MD). Foods and food ingredients for prevention of diarrheal disease in children in developing countries. *Journal of Food Protection* 51(1); 1988; 66-75

Morbidity and mortality data relating to diarrheal disease among

children under 5 years of age in developing countries has led to a variety of approaches aimed towards the prevention of these disease. The review reports the types of foods and food ingredients which appear to be most effective in prevention of the disease in infants. Various human milk components, antibodies, probiotics and fermented foods have been reported to be effective in prevention of diarrheal illness in children of developing countries. The effect of these foods or food ingredients on control or prevention of causative organisms is also discussed. CTD

- 1775 Simonsen (B), Bryan (FL), Christian (JHB), Roberts (TA), Tompkin (RB) and Silliker (JH). Prevention and control of food-borne salmonellosis through application of Hazard Analysis Critical Control Point (HACCP). *International Journal of Food Microbiology* 4(3); 1987; 227-247

Report from the International Commission on Microbiological Specifications for Foods (ICMSF). The ICMSF ad hoc committee has selected a number food categories for prevention and control of salmonellosis as per the WHO guidelines (1983). The committee has also identified the critical control points during their processing, and describes the monitoring of these points. Application of HACCP covers high moisture foods (raw meat, poultry, turkeys), low moisture foods (dried milk, desiccated coconut, milk chocolate, peanut butter, dried infant formulas, corn-soy-milk, and dried soup mixes, pastas), fermented foods (fermented sausages) and acidified foods (mayonnaise, salad dressings and related products). BV

Shigella

- 1776 Smith (JL). *Shigella* as a foodborne pathogen. *Journal of Food Protection* 50(9); 1987; 788-801

BIOTECHNOLOGY

- 1777 Betrabet (SS). Financing technology development and biotech projects. *Chemical Age of India* 38(9); 1987; 467-471

- 1778 Bhandari (HC). An approach towards promoting biotechnology based industry in India. *Chemical Age of India* 38(8); 1987; 391-393

Covers developments and industrial applications, suggestions for taking up new biotechnology, and list of various biotechnolog projects. BV

- 1779 Chandrasekhar (S). Strategy for biotechnology development. Suggested framework on institutional linkage. *Chemical Age of India* 38(9); 1987; 465-466

- 1780 Gharpure (YH). Industrial applications of biotechnology. *Chemical Age of India* 38(8); 1987; 407-409

Considers evolutions of biotechnology and its progress in India

with emphasis on the challenges before the country by the year 2000. Agriculture, health, energy, use of genetic engineering in other areas (food additives, effluent treatment/environmental control) and action plan are also dealt with. BV

- 81 Ghose (TK). An overview of R&D and training facilities for biotechnology. *Chemical Age of India* 38(8); 1987; 403-405

- 82 Gokarn (RN) and Khadke (SV). Recent developments in separation process for biotechnology. *Chemical Age of India* 38(8); 1987; 411-413

Discusses steps in combining the two-stage process of separation and extraction into a single operation by converting an ordinary decanter centrifuge into an extraction decanter. Whole broth solvent extraction, counter-current extraction decanter, process sequence, advantages over conventional processes, applications, consideration of economics, and developments in India. BV

- 83 Jagannathan (V). Application of plant biotechnology. *Chemical Age of India* 38(9); 1987; 459

Recent advances in plant biotechnology is discussed. Covers briefly tissue culture and genetic engineering. BV

- 84 Koppikar (U). Biotechnology for rural masses. Some innovative approaches. *Chemical Age of India* 38(10); 1987; 529-534

- 85 Manchiraju (S). Laboratory production of biogas. *Chemical Age of India* 38(10); 1987; 547

Laboratory production of biogas by anaerobic treatment of biomass. BV

- 86 Rege (DV). Need for strengthening biotechnology R&D base. *Chemical Age of India* 38(9); 1987; 455-457

Covers biotechnology research in India, emerging area of biotechnology, major research centres in India and shortcomings. BV

- 87 Shinagare (KK). Process equipment in biotechnology. *Chemical Age of India* 38(8); 1987; 415-419

Covers definition of biotechnology, biological agents, multi/inter disciplines of biotechnology, historical milestones in development of biotechnology, process equipment for biotechnology, safety standard in biotechnology, major biotech companies, and biotechnology products, (agriculture, food and beverages, chemicals, energy and specialities). BV

- 88 Veeramani (H). Fluidised bed systems for anaerobic biotechnology in waste management. *Chemical Age of India* 38(10); 1987; 543-546

- 89 Wasserman (BP), Montville (TJ) and Korwek (EL). Food biotechnology. *Food Technology* 42(1); 1988; 133-146

Aspects covered include tools of food biotechnology-genetic engineering, screening from nature, mutagenesis and selection; continuous culture selection and plant tissue culture immunoassays; applications of biotechnology-production and improvement of enzymes, improvement of traditional fermentations (dairy products, meat products, cheese flavour and vegetable products), microbial synthesis of food ingredients and regulatory considerations-criteria for adulteration, premarket clearance and FDA positions. 148 references. BV

TISSUE CULTURE

Nil

FOOD ADDITIVES

- 1790 Reardon (P). Pale but interesting. Food, Flavourings, Ingredients, Packaging and Processing 10(1); 1988; 37-41

This article briefly discusses the removal of artificial additives such as colours, flavours and preservatives in preserves i.e., jam, jelly and marmalade. While some of these additives can now readily be omitted, a number of other additions such as pectin still remain. SYR

Antioxidants

- 1791 Coulter (RB). Extending shelf life by using traditional phenolic antioxidants. Cereal Foods World 33(2); 1988; 207-210

The author has reviewed status of different phenolic antioxidants to control the shelf life of different food products. PHR

Colorants

Dyes

Tartrazine

- 1792 Robinson (G). Tartrazine-the story so far. Food and Chemical Toxicology 26(1); 1988; 73-76

Reviews the effect of tartrazine on asthmatic patients, hyperactive children, urticaria patients, including mechanisms. BV

Preservatives

Adipic acid

- 1793 Yamamoto (Y), Karube (N), Higashi (K) and Yoshii (H). Inhibitory activity of adipic acid on food spoilage microorganisms. Studies on

growth inhibition of food spoilage microorganisms for low salt foods, Part VI. Journal of Japanese Society of Food Science and Technology '(Nippon Shokuhin Kogyo Gakkaishi)' 34(2); 1987; 88-93 (Ja).

The inhibitory activity of adipic acid on 10 strains of yeasts and 33 strains of food spoilage bacteria including 6 strains of lactic acid bacteria was investigated. The following results were obtained. (1) Adipic acid protracted the lag phase, extended the mean generation time and decreased the max. number of cells of *Escherichia coli* at pH 5.0. (2) When the pH of liquid medium was adjusted by adipic acid, the growth of food spoilage bacteria was inhibited between pH 4.2 and 5.2. (3) No significant inhibitory effects of adipic acid on food spoilage bacteria were observed at pH 6.0. However, growth of the most tested bacteria was inhibited with the concn. < 0.2% at pH 5.0. (4) Min inhibitory concn. of adipic acid on the growth of lactic acid bacteria were 0.4-1.8%. Therefore, it seemed difficult practically to prevent the growth of lactic acid bacteria completely by the sole use of adipic acid. (5) Growth of yeasts was scarcely affected with the addition of adipic acid. AS

Potassium sorbate

- 1794 Flores (LM), Palomer (LS), Roh (PA) and Bullerman (LB). Effect of potassium sorbate and other treatments on the microbial content and keeping quality of a restaurant-type Mexican hot sauce. Journal of Food Protection 51(1); 1988; 4-7

Spoiled and unspoiled restaurant-made Mexican hot sauces were examined for presence of pathogenic and spoilage microorganisms. Studies to determine whether microorganisms isolated from the sauce could grow and cause spoilage were also carried out. The effects of potassium sorbate at various levels (0, 0.02, 0.03, 0.05, 0.1 and 0.2%) on the keeping quality of the sauce were also determined. Spoiled sauce had microbial counts 4 log-cycles higher than the unspoiled sauce. Bacteria were either very few or absent in all the samples and were unable to grow when reinoculated. The pH of the sauce was below 4.5 yeasts increased after 10 d of incubation and were the main organisms that caused the spoilage. Potassium sorbate at 0.05% was inhibitory to yeasts in both original and inoculated sauces. Levels of 0.02 and 0.03% were only fungistatic. Benzoic acid at 0.05% was also inhibitory, while heating at 80 C for 10 min. did not extend shelf life appreciably, and acidification to pH 3.5 increased shelf life only slightly. AS

Stabilizers

Pectins

- 1795 Johnson (RM) and Breene (WM). Pectin gel strength measurements. Food Technology 42(2); 1988; 87-93

This article describes research to evaluate the Pektinometer as a device for measuring the strength of standard pectin gels and to compare its precision with that of a simpler instrument, the Chatil-

lon, and a more sophisticated instrument, the Instron; to modify the Pektinometer to permit its operation in a push mode as well as a pull mode; and to compare the precision of the two modes in all three instruments. The article discusses the influence of push or pull rate on recorded mean gel strength values using the Instron. BV

Sweeteners

- 1796 Pandey (A) and Poonam Nigam. Non-nutritive sweeteners in food systems. *Indian Food Industry* 6(4); 1987; 157-165

Review covers the definition of non-nutritive sweeteners its characteristics, types (saccharin, cyclamate, aspartame, acesulfame-K, stevioside, talin protien(thaumatin), glycyrrhizin, dihydrochalcones, synthetic sweeteners, L-sugars: Lev-O-Cal); application in food systems (beverages, baked goods, confectionery, dairy products/frozen desserts, preserves, canned products and breakfast cereals), toxicity and safety, regulatory aspects and future developments. 10 references. BV

Aspartame

- 1797 Pszczola (DE). Applications of aspartame in baking. *Food Technology* 42(1); 1988; 56, 58

Encapsulation protects aspartame from heat and prevents loss of sweeteners intensity in baked goods and baking mixes. BV

CEREALS

- 1798 Chang (CS). Measuring density and porosity of grain kernels using a gas pycnometer. *Cereal Chemistry* 65(1); 1988; 13-15

Porosities, true densities, and apparent densities of corn, wheat, and sorghum kernels were determined with a gas pycnometer. Av. true densities for corn, wheat and sorghum grain were 1.45, 1.47 and 1.46 g/cm³ resp. Av. apparent kernel densities for corn, wheat, and sorghum grain were 1.27, 1.39 and 1.32 g/cm³ resp. Av. kernel porosities for corn, wheat, and sorghum were 12.5, 5.2 and 9.8% resp. More than 80% of void spaces in corn kernels were isolated from the outside. For wheat and sorghum grain, the isolated void spaces were 30 and 52% resp. AS

- 1799 Wilson (CM). Electrophoretic analyses of various commercial and laboratory-prepared zeins. *Cereal Chemistry* 65(1); 1988; 72-73

Rice

- 1800 Bhattacharya (KR). How Thailand maintains her rice quality: Lessons for India. *Indian Food Industry* 6(4); 1987; 171-175

Discusses the quality of Thai rice. Aspects covered include

Thailand rice surplus and export, grading, informal grading of domestic rice and paddy, test mill and moisture meter, rice varieties, grain characteristics, quality control before release outlet, for broken rice, and guidelines for India. BV

- 1801 Hibi (Y) and Kuge (T). Effects of fatty substances on the early process of retrogradation of starch. *Journal of the Japanese Society of Starch Science* '(Denpun Kogyo Gakkaishi)' 34(4); 1987; 271-278

In the early process of retrogradation of cooked rice, the amount of the water-soluble fraction and the degree of gelatinization firstly increased, and thereafter continuously decreased. The presence of a few helical complexes of starch and fatty substances was indicated by the V type of X-ray diffraction pattern. A crystalline structure was recovered after disappearance of the helical complexes. In this study, the effects of fatty substances and the degree of gelatinization after heating on the above mentioned phenomenon were examined. The results were as follows. 1) The phenomenon was seen in the cases of retrogradation of rice, rice regenerated with fatty acid and rice starch, but not for defatted rice and defatted rice starch. The B type of X-ray diffraction pattern reappeared earlier for defatted samples than for non-defatted ones. 2) Even for non-defatted samples, when the degree of gelatinization was sufficiently high, the phenomenon was not observed, and when the degree was low, it was observed at a different stage, depending on the degree of gelatinization. The B type of X-ray diffraction pattern reappeared earlier for the samples showing low degrees of gelatinization than for ones showing high degrees. 3) During the retrogradation, the amount of the water-soluble fraction increased and then decreased with time, molecules with mol. wt. of less than 10^6 being remarkably water insoluble. AS

- 1802 Perez (CM) and Juliano (BO). Varietal differences in quality characteristics of rice layer cakes and fermented cakes. *Cereal Chemistry* 65(1); 1988; 40-43

Var. differing in amylose content(AC) and final gelatinization temp. (GT) were used to determine the most suitable rices for layer and fermented cakes. Using the layer cake formula of Bean et al (1983), acceptable cakes were obtained with nonwaxy low-GT rice flours; increasing the amount of water in the batter based on AC improved cake height. Collapsed cakes were obtained with intermediate-high GT nonwaxy flours; slightly improved cake volume but coarser texture was obtained by reducing sucrose in the batter to ensure starch gelatinization. Fermented rice cakes (puto) without starter showed optimum texture for intermediate AC rices measured by double-bite technique and a laboratory panel, but cake height also correlated positively with AC. AS

Wheat

- 1803 Akmal Khan (M), Rana (IA) and Ullah (I). Nutritional evaluation of some commercial wheat var. grown in Pakistan. *Qualitas Plantarum - Plant Foods for Human Nutrition* 37(3); 1987; 253-260

The nutritive value of some commercial wheat var. grown in Pakistan was measured chemically including amino acid analysis, and biologically in N-balance experiments with growing rats. The protein content ranged from 13.2% in Punjab-83 to 16% in Barani 83. Lysine per 100 g protein varied between 2.46 and 2.75%. The available carbohydrate ranged from 67.3 to 74.7%. Iron content was highest in Sonalika while the concn. of zinc and manganese was highest in Sarhad-82. The protein digestibility (PD), biological value (BV) and net protein utilisation (NPU) varied between 92-95%, 56-68% and 53-65% resp. Level of wheat protein was negatively correlated with available carbohydrate ($r = -0.93$), lysine per unit protein ($r = -0.67$) and BV ($r = -0.76$). The lysine content (g/16 gN) of commercial wheat var. showed a positive correlation ($r = \text{plus or minus } 0.95$) with the BV. The protein quality was lowered in var. having higher content of protein. AS

- 1804 Friesen (TL), Brusewitz (GH) and Lowery (RL). An acoustic method of measuring moisture content in grain. *Journal of Agricultural Engineering Research* 39(1); 1988; 49-56

The objective of this study was to devise a method to determine the instantaneous sound pressure level characteristics of a flowing grain. Five different sample groups of hard red winter wheat were used to measure the characteristics of sound generated by wheat falling on wheat at moisture contents varying from 11 to 19%. The sound signals were analysed in 5Hz to 50 KHz range. Based on the results a mathematical relationship was developed to express sound level (dB) as a function of sound frequency and moisture content. The sound level decreased across the entire frequency range as moisture content increased. The sound level was well correlated with the grain moisture in the frequency range of 10 and 20 KHz. RS

- 1805 Lupano (CE) and Anon (MC). A simple and rapid test for drying damage in wheat. *Cereal Chemistry* 65(1); 1988; 49-51

A simple test, based on the fact that the rate of carbon dioxide production is lower in heat-damaged seeds, allowed their rapid identification. Carbon dioxide release was determined by measuring the colour change of a pH indicator in the incubation medium. Highly significant correlation between this test and germination was found for the wheat var. utilized. AS

Wheat bran

- 1806 Schwarz (PB), Kunerth (WH) and Youngs (VL). The distribution of lignin and other fiber components within hard red spring wheat bran. *Cereal Chemistry* 65(1); 1988; 59-64

Three bran tissue layers were separated from the hard red spring wheat var., Len, by mechanical treatments in water, NaOH-ethanol, and ethanol. The isolated layers corresponded to the outer pericarp, inner pericarp, and seed coat. The pericarp preparations were obtained at high purity, whereas the seed coat fraction was contamin-

ated with the other tissues. The volume of the contaminating tissues present was determined through microscopy. Lignin and cutin, present in all three tissue isolates, occurred, at higher levels in the inner pericarp and seed coat. The levels of cellulose and noncellulosic polysaccharides were similar in the inner and outer pericarp, constituting over 75% of the tissue dry weight. The seed coat exhibited a lower level of these constituents, but in contrast, contained an elevated level of uronic acids. AS

Wheat flour

- 1807 De Stefanis (VA). Analysis of azodicarbonamide in wheat flour by liquid chromatography. *Cereal Chemistry* 65(1); 1988; 52-55

A liquid chromatographic (LC) procedure was developed for the analysis of azodicarbonamide (ADA) in wheat flour. Presence of either potassium bromate or potassium iodate did not interfere with the analysis. ADA was extracted with acetone from flour. An aliquot of the extract was evaporated to dryness (23-25 °C). The ADA in the residue was extracted with 0.5% K_2HPO_4 buffer (pH 8.40) and the lipids with n-hexane, simultaneously. The ADA was analyzed by LC using an external flour standard of known treatment. The method was developed for the quantitation of 1.0-45.0 p.p.m ADA in wheat flour. A detailed description of the method is given. AS

- 1808 Graveland (A). Structure and functional properties of glutenine. *Getreide, Mehl und Brot* 42(2); 1988; 35-38 (De).

Isolation methods for glutenin from wheat flour are described. The functional characteristics of gluten have been ascribed to be dependent on the following factors. (1) the glutenin-gliadin ratio; (2) the molecular size of glutenin fractions (I, II, & III) and their proportion; (3) the molecular structure of glutenins, whether straight chained or branched; (4) the bonding forces between glutenins and gliadin; and (5) the reduction or oxidation ability of glutenins. The above properties and factors, and also the available concn. of gluten determine the consistency and viscoelastic behaviour of dough and on account of this are responsible for the quality of baked products from wheat. SZA

- 1809 Hazell (T) and Johnson (IT). The influence of beverages and condiments on in vitro estimated iron availability from wheat flour and potato. *Food Chemistry* 27(2); 1988; 151-161

This investigation was carried out to investigate the influence of beverages and condiments on in vitro estimated iron availability from two commonly consumed foods wheat flour and potato. Beverages and condiments were mixed with either wheat flour or potato and were digested in vitro under simulated physiological conditions. The proportion of iron diffusing across a semipermeable membrane was used as an index of bioavailability. The results showed that tea, coffee, cocoa and milk, salad cream, tartare sauce and horse radish sauce greatly reduced iron diffusibility from potato whereas lemonade, tonic water, Lucozade, orange juice, MSG and salt greatly enhanced iron dif-

fusibility from both potato and wheat flour. This has been attributed to certain constituents of the beverages and condiments. It is therefore important that choice of suitable beverage or condiments consumed with a meal is bound to have large influence on iron availability. NGKR

Wheat proteins

- 1810 Dreese (PC), Faubion (JM) and Hosene (RC). The effect of different heating and washing procedures on the dynamic rheological properties of wheat gluten. *Cereal Foods World* 33(2); 1988; 225-228

- 1811 Kobrehel (K), Reymond (C) and Alary (R). Low molecular weight durum wheat glutenin fractions rich in sulphhydryl plus disulphide groups. *Cereal Chemistry* 65(1); 1988; 65-69

Durum wheat glutenin fractions with sulphhydryl (-SH) plus disulphide (S-S) groups content of 185 and 140 Mol/g of protein for cv. Mondur and Kidur, resp., were extracted from gluten with Na tetradecanoate (2.5 mg/g of gluten) after extraction of gliadins. Amino acid analyses confirmed the high content of cysteine in these as compared to other glutenin fractions. Some inter varietal differences were also noted. Sodium dodecyl sulphate-polyacrylamide gel electrophoresis (SDS-PAGE), without reduction, showed these proteins to consist of two major low mol. wt. proteins., DSG-1 and DSG-2 (durum wheat sulphur-rich glutenin fractions) of 14.1 and 17.7 KDa. resp. After reduction, SDS-PAGE showed DSG-1 to be composed of two subunits of lower mobility than DSG-1, having apparent mol. masses of 14.6 and 14.7 KDa. The SDS-PAGE mobility of DSG-2 increased after reduction to approx. 15.8 KDa. At pH 3.1 the electrophoretic mobility of DSG-2 was greater than that of DSG-1; both ran faster than gliadins under similar conditions. AS

- 1812 Marchylo (BA), Hatcher (DW) and Kruger (JE). Identification of wheat cultivars by reversed phase high performance liquid chromatography of storage proteins. *Cereal Chemistry* 65(1); 1988; 28-40

Reversed Phase-High Performance Liquid Chromatograph (RP HPLC) technique was used to separate the wheat storage protein comprising of gliadin and low and high mol. wt. glutenins. The resultant chromatograms were used to identify 19 Canadian and 8 American spring wheat cvs. The peak or relative peak areas gave highly significant linear correlations with cv. concn. This provided a basis for quantitative computer analysis of admixtures. AR

- 1813 Pearce (LE), Davis (EA), Gordon (J) and Miller (WG). Electron spin resonance studies of isolated gluten systems. *Cereal Chemistry* 65(1); 1988; 55-58

Electron Spin Resonance (ESR) was used to study paramagnetic species present in commercial gluten powder and the conformational changes of hydrated gluten after heating. The study also showed that TEMPO spin probes can be used to differentiate between microenviron-

ments that are hydrophilic or hydrophobic in nature, whether as such or on heating. AR

MILLETS

Corn

- 814 Montani (ML), Vaamonde (G), Resnik (SL) and Buera (P). Influence of water activity and temp. on the accumulation of zearalenone in corn. *International Journal of Food Microbiology* 6(1); 1988; 1-8

The influence of water activity and temp. on the zearalenone biosynthesis in corn has been examined. Viable corn kernels were conditioned at different values of water activity (0.90, 0.95 and 0.97) inoculated with *Fusarium graminearum* and incubated at different temp. Zearalenone was determined at selected times. For the strain used, a constant temp. of 25 C resulted more favourable than 15 C, 20 C, and the combination of two wks at 25 C followed by incubation at 15 C shown by other authors to increase the zearalenone accumulation. Both *F. graminearum* growth and zearalenone production at 25 C were inhibited at water activity 0.90. At short incubation times, toxin accumulation was greater at water activity 0.97 than at water activity 0.95 (25 C). This relation was inverted at longer periods of incubation. A combined effect of water activity and temp. on the zearalenone accumulation was observed. AS

Pearl millets

- 815 Birzer (DM) and Klopfenstein (CF). The pearl millet goitrogens. *Cereal Foods World* 33(2); 1988; 229-231

Although insufficient dietary iodine is probably the most important cause of goiter worldwide, the presence of goitrogenic substances in the daily food supply is also a significant factor. Cassava, members of the cabbage family, peanuts, soybeans, and pearl millet grain all contain those substances. Evidence indicates that a number of factors contribute to the goitrogenicity of pearl millet, which is a dietary staple for millions of people in Africa and India. In addition to small amounts of a cyanide-containing compound, the grain's flavonoid pigments and their hydrolysis products appear to be responsible for changes in rat thyroid histology and hormone imbalance. AS

PULSES

- 816 Bhatti (RS). In vitro hydrolysis of pea, faba bean and lentil meals and isolated protein fractions by pepsin and trypsin. *Canadian Institute of Food Science and Technology Journal* 21(1); 1988; 66-71

Reports the in vitro hydrolysis of pea, faba bean and lentil meal proteins and their fractions, albumins, globulins, and G 1 (legu-

min) using pepsin and trypsin. The objective was to determine if difference in the in vitro hydrolysis of the protein fractions, particularly the albumins and globulins, was responsible for the higher in vivo digestibility of pea protein isolates. BV

- 1817 Gupta (YP). Anti-nutritional and toxic factors in food legumes. A review. *Qualitas Plantarum - Plant Foods for Human Nutrition* 37(3); 1987; 201-228

This comprehensive review on antinutritional and toxic factors in food legumes covers factors affecting digestibility; saponins; proteolytic inhibitors; lathyrogens; phytohemagglutinins; favism, and cyanogenetic glycosides. 268 references. BV

Bengal gram

- 1818 Birender (K), Soni (GL) and Singh (R). Nutritional evaluation of gram (*Cicer arietinum*) varieties. *Human Nutrition: Food Sciences and Nutrition* 41F(2); 1987; 121-128

Var. of grain (*Cicer arietinum*), viz., Bengal gram (Brown). Kabli gram (White) and green gram have been evaluated for their nutritional status as well as for their hypocholesterolemic action. Bengal gram had the highest protein content (25%) whereas green seeded had the least (20.6%). The apparent protein digestibility of Kabli gram was the highest (84.1%) and that of green seeded gram was the least (75.3%). The PER value for Bengal gram (1.65 plus or minus 0.12) was the highest followed by green seeded gram (1.57 plus or minus 0.15) and Kabli gram (1.52 plus or minus 0.18). All these var. showed considerable hypolipidemic and hypocholesterolemic effects. Green seeded gram and Kabli gram had a considerably higher hypocholesterolemic and hypolipidemic effect as compared to Bengal gram. AS

Cowpeas

- 1819 McWatters (KH), Chinnan (MS), Hung (Y-C) and Branch (AL). Effect of precortication drying temperature on cowpea paste characteristics and functionality in preparation of akara. *Cereal Chemistry* 65(1); 1988; 23-27

Cowpeas (*Vigna unguiculata*, cv California Blackeye No. 5) were conditioned for dry, mechanical abrasive decortication by adjusting the moisture content to 25% holding for 30 min. with occasional stirring, and drying (50, 70, 90, 110, and 130 °C) in a rotary forced air dryer to a moisture content of approx. 10%. Decorticated seeds were ground, hydrated to 58% moisture content, whipped, and evaluated for paste sp. gr., apparent viscosity, and functionality in preparation of akara (fried cowpea paste). Paste sp. gr. and apparent viscosity (at shear rates greater than 1.7 sec^{-1}) increased with increasing drying temp.; however, no adverse effects on paste dispensing and frying characteristics were observed except with the 110 and 130 °C treatments. Akara batter from the latter treatments failed to separate into individual balls during dispensing; the end products had tough crusts, undercooked interiors, and unusually high moisture (51%) and

low crude fat (14%) contents. Akara from all drying treatments was darker (lower Hunter L values) and redder (higher Hunter a values) than akara made from cowpeas that had not been treated (control). Overall, the 50, 70 and 90 °C treatments produced akara that compared favourably in sensory attributes to the control. AS

- 1820 Muralikrishna (G), Ramadas Bhat (U) and Tharanathan (RN). Functional characteristics of the mucilaginous polysaccharides derived from cowpea (*Vigna sinensis*), black gram (*Phaseolus mungo*) and linseed (*Linum usitatissimum*). *Starch/Stärke* 39(4); 1987; 107-109

The cowpea polysaccharides had the max. viscosity at around pH 6 and it decreased with increase in temp. but increased with increase in concn. Both black gram and cowpea polysaccharides stabilized against thermal disruption the foam formed by the surface active proteins. Black gram starch and the mucilage together showed greater foam stability, probably due to enhanced viscosity caused by synergistic interactions between these polysaccharides. Gelatinization temp. as well as the peak and set back viscosities of wheat starch were considerably decreased by adding either the black gram or the linseed polysaccharide. In farinograph experiments the black gram polysaccharide exhibited a strengthening effect on wheat flour dough, whereas the linseed polysaccharide resulted only in an increased water absorption. Extensographic data indicated increased resistance and decreased extensibility of wheat flour dough by the addition of black gram and linseed polysaccharides. AS

- 1821 Omueti (O) and Singh (BB). Nutritional attributes of improved varieties of cowpea (*Vigna unguiculata* (L.) Walp.) *Human Nutrition: Food Sciences and Nutrition* 41F(2); 1987; 103-112

Thirty seven newly developed cowpea var. were chemically analysed for various nutritional attributes. The composition of cowpea var. ranges from protein (20.30 to 20 to 05%), free sugar (5.9 to 8.3%) starch (39.1 to 54.9%), crude fibre (2.7 to 5.8%) and total ash (2.6 to 4.2%). Var. IT82E - 32 had the highest protein content, IT81D - 994 had the largest seed size, IT82E - 70 had the max. free sugar and IT81D - 988 had the lowest fibre content. All the var. were rich in K, Na, Mg, P, Fe but relatively low in Ca content. BV

Kidney beans

- 1822 Lopez (A) and Williams (HL). Essential elements in dry and canned kidney beans (*Phaseolus vulgaris* L.) *Journal of Food Protection* 51(1); 1988; 39-42

Ten essential mineral elements were determined in dry and in canned kidney beans (*Phaseolus vulgaris* L.). Samples were taken at different stages during the canning process to determine where changes in element content occurred. Canned kidney beans contained significantly lower concn. of Fe, Mg, Mn, K, and Zn than dry kidney beans, on a dry wt. basis. These decreases were probably caused by the elements being extracted out during soaking and blanching of the kidney beans and/or during the actual thermal processing where elements were

extracted into the can liquid. There was a significant increase in Ca in the canned product and no significant difference in Cu and P contents between the dry and canned products. Chloride and Na content in canned kidney beans increased due to the NaCl content of the filling medium, and their concn. varied depending on the concn. of the medium used. Retention of all elements, except Cl and Na, ranged from 61 to 117% on a dry wt. basis and from 19 to 36% on wet wt. basis, retention being defined as the ratio of content in the canned to that in the dry product as received at the plant. AS

Winged beans

- 1823 Prakash (D), Misra (PN) and Misra (PS). Amino acid profile of winged bean (*Psophocarpus tetragonolobus* (L) DC): A rich source of vegetable protein. *Qualitas Plantarum - Plant Foods for Human Nutrition* 37(3); 1987; 261-264

Twenty one cvs. of winged bean (17 of Indian origin and 4 exotic strains obtained from Sri Lanka) were cultivated on marginal (alkaline) soil in the sub-tropics and evaluated for their food value. Whereas the seeds showed wide variations in total protein content (38.1 to 45%) the amino acid compositions were in close proximity to those of soybean. Nevertheless, some strains of winged bean registered higher levels of certain amino acids as compared to soybean. AS

OILSEEDS AND NUTS

Groundnuts

- 1824 Mbata (GN). Preliminary observations on the incidence of insect pests and related deterioration in the quality of stored groundnut in some parts of Northern Nigeria. *Insect Science and its Application* 8(1); 1987; 15-19

Tribolium castaneum (Herbst) and *Oryzaephilus mercator* (Fauvel) were most abundant and widely distributed insect pests. *Ephestia cautella* (WIK) constituted less than 1% of insect pests found on the groundnuts, but *Plodia interpunctella* (Herbst) was absent in out-door pyramid storage. Groundnuts kept in in-door storage had high moisture content, while nuts from farm and open air pyramid storage had low moisture content. Lipid, peroxide and free fatty acid values from groundnuts were directly related to the levels of infestation. BV

Rapeseeds

- 1825 Delisle (J), Chamberland (B) and Roy (A). Nutritive value of acetylated and hydrolysed rapeseed proteins in rats. *Qualitas Plantarum - Plant Foods for Human Nutrition* 37(3); 1987; 265-274

Acetylated, hydrolysed and unmodified rapeseed proteins were compared to casein for nutritive value as determined by net protein ratio (NPR) and nitrogen apparent digestibility coeff. (ADC). The NPR

and nitrogen ADC values of rapeseed proteins did not change significantly ($P < 0.05$) after hydrolysis but decreased significantly ($P < 0.05$) after 30% and 70% acetylation. Acetylation (30%) followed by protein hydrolysis decreased significantly ($P < 0.05$) the NPR value but increased significantly ($P < 0.05$) the N digestibility compared to the control and unmodified rapeseed proteins. Casein gave the highest value ($P < 0.05$) for NPR and nitrogen and nitrogen ADC. Modification of rapeseed proteins significantly ($P < 0.05$) decreased the nutritive value, and the effect was more pronounced with increasing level of acetylation. AS

- 1826 Fiebig (H-J). Determination of total glucosinolate content in rapeseed by measurement of enzymatically released glucose. *FAT Science and Technology* 90(1); 1988; 14-18 (De).

Methods for detn. of glucosinolates in mustard seeds have been discussed. Methods have been developed to estimate glucose released by the action of myrosinase and to calculate glucosinolate present in mustard. N

Soybeans

- 1827 Laszlo (JA). Content and stability of ferrous iron in soybean hulls. *Cereal Chemistry* 65(1); 1988; 20-23

Soybean hulls are a rich source of highly bioavailable dietary iron. The chemical properties of iron in soybean hulls were examined to identify characteristics that would explain the availability of iron from this source. Ferric and ferrous ions were extracted from the hull with 2N HCl and quantitated by ion chromatography. It was found that most of the iron was in the ferrous state; the proportion varied with soybean var. and crop year. The Fe(II) was stable to chemical oxidants, yet readily solubilized by acidic conditions comparable to those found in the human gastrointestinal tract. These studies suggest that the high bioavailability of soybean hull iron is result of the presence of stable Fe(II) in this tissue. AS

- 1828 Ranjana Narayan), Chauhan (GS) and Verma (NS). Changes in the quality of soybean during storage. Part I. Effect of storage on some physico-chemical properties of soybean. *Food Chemistry* 27(1); 1988; 13-23

TUBERS AND VEGETABLES

Root vegetables

Beet

- 1829 Michel (F), Thibault (J-F), Barry (J-L) and de Baynast (R). Preparation and characterisation of dietary fibre from sugar beet pulp. *Journal of the Science of Food and Agriculture* 42(1); 1988; 77-85

Tubers

Potatoes

- 1830 Golachowski (A). Properties of starch obtained from frozen and thawed potato tubers. *Starch/Starke* 39(4); 1987; 119-121

- 1831 Gross (T) and Steinhart (H). Remission-photometrical measuring of potatoes darkening during cooking and its correlation with the iron content in tissue segments. *Deutsche Lebensmittel-Rundschau* 84(1); 1988; 1-5 (De).

To determine iron in potatoes we apply a sensitive photometrical method using of errozine as a reagent. Prior to the detn. comes an acid solubilization with HCl/nitric acid, and then extraction and enrichment of Fe by means of isobutyl methyl ketone. The darkening of cooked potatoes can be determined through remission-photometrical measuring of the discoloured tissue. Investigations into the distribution of iron in tubers, on potatoes of the sp. Bintje for example, have shown that the iron is predominantly concentrated in the cortex layer. Regular household cooking will leach out 6 to 23% of the iron in the cortex layer. A comparison and conformation of Fe contents and the darkening of navel and crown ends of potatoes of the sp. Bintje, Hela and Christa show no direct dependence on darkening and the Fe content of the tuber tissue. As a standard for the darkening of potatoes during cooking we defined the cooking darkening intensity (KI). KI value determined do not correlate with the Fe content of the cortex layer. AS

- 1832 Kubota (K), Kurokawa (M), Suzuki (K) and Esaka (M). Study on a microwave cooking-rate equation of cylindrical potato. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi') 35(2); 1988; 78-82

In this paper a microwave cooking rate equation of cylindrical potato is studied. The values of Arrhenius parameters in the equation were calculated by using a non-linear least square method. The cooking-rate equation obtained was as follows. $\frac{dx}{d\Theta} = A \exp(-E/RT) (1-x)$ $A = 1.52 \times 10^4$, $E = 7.65 \times 10^4$ J. mol⁻¹, $n = 1.0$ where x (-) is the cooking ratio Θ (s) the cooking time, T (K) the cooking temp. and R_0 gas constant 8.314 J mol⁻¹/K⁻¹. The value of activation energy obtained was lower than $1.23 - 1.24 \times 10^5$ J. mol⁻¹ obtained for the hot water dipped cooking. AS

- 1833 Matheis (G). Polyphenol oxidase and enzymatic browning of potatoes (*Solanum tuberosum*). II. Enzymatic browning and potato constituents. *Chemie Mikrobiologie Technologie der Lebensmittel* 11(2); 1987; 33-41

The qualitative and quantitative relationships between potato constituents and rate of browning, as well as on the influences of extrinsic factors on potato constituents and, consequently, on the rate of browning is discussed in this review. BV

- 1834 Slominska (L) and Starogardzka (G). Application of a multi-enzyme complex in the utilization of potato pulp. *Starch/Stärke* 39(4); 1987; 121-125

The results of experiments show that the influence of the multi-enzyme complex on the decrease of viscosity and the increase of dry substance content of the enzyme-treated potato pulp. The action of liquefying and saccharifying enzymes on multi-enzyme complex pretreated potato pulp yields a higher degree of liquefaction and saccharification. BV

- 1835 Thornton (MK) and Workman (M). Changes in ascorbic acid content of blackspot resistant and - susceptible potatoes following bruising. *HortScience* 22(3); 1987; 455-456

Experiments were conducted to determine if changes in tuber ascorbic acid content following bruising were related to blackspot susceptibility in potato (*Solanum tuberosum* L.). Tubers of four potato clones were bruised at three locations. Ascorbic acid content of bruised and nonbruised tissue on the same tubers was determined 0, 3, 6, 12, and 24 h after bruising. Differences in initial ascorbic acid content between clones were highly significant, but not related to blackspot susceptibility. Differences in ascorbic acid content between bruised and nonbruised tissue of a tuber were significant in two of the four clones. Changes in ascorbic acid content of tubers with time occurred to a similar extent in bruised and nonbruised tissue. This experiment indicates that factors other than ascorbic acid content may determine differences in clonal susceptibility to blackspot. AS

Potato starch

- 1836 Mica (B) and Vokal (B). Conditions for formation of dry substance and starch with two types of starch potato sorts. *Starch/Stärke* 39(4); 1987; 110-114 (De).

Two types of starch potato sorts (Kamyk. Boubin) were field tested. It was found that herb destruction is not favourable. It reduces tuber yield, content of dry substance and starch and increases the percentage of small tubers. Fertilization should depend upon type of the sort. With the stalk type, higher doses (120 Kg N) may be used. Doses of P should depend upon P content in the soil starting from 50 Kg P upward. With the leave type, 100-120 Kg N, and 50 Kg P are sufficient. AS

- 1837 Schwardt (E) and Kempf (W). Starch production from preserved potato gratings. *Starch/Stärke* 39(4); 1987; 114-119

During industrial starch production potato gratings are produced which can be preserved by the addition of a 1.2% sodium hydrogensulphite solution. Preserved this way the durability of the gratings is defected neither by extreme differences in temp. nor by storage of 6 months and even longer. After storage the gratings can be returned into the industrial process to obtain the starch by washing out. The

quality of this starch differs from the quality of potato starch washed out from non-preserved gratings. The pH value is somewhat lower and the hot paste viscosity is slightly reduced. Contrary to this the typical curve of potato starch in the Brabender Viscograph remains the same. AS

- 1838 Yamada (T), Morimoto (Y), Hisamatsu (M) and Komiya (T). The effect of phosphoric acid bound with potato starch on its starch gelatinization. *Starch/Stärke* 39(6); 1987; 208-211

A series of potato starch substituted with proton, K and Ca ion were prepared with washing method by hydrogen chloride solution, and their properties were compared with that of native starch on viscograph. After viscograph test, these samples were subjected to gel chromatography and compared with that of non-test samples. It was proved by GPC pattern analysis that with the starch substituted with proton some extent of hydrolysis took place during viscographic measurement process. The role of phosphoric acid bound with starch in this hydrolysis was discussed in relation to its content, locus, and distribution in the amylopectin molecules. AS

Tapioca

- 1839 Srikanta (S), Jaleel (SA) and Sreekantiah (KR). Production of ethanol from tapioca (*Manihot esculenta* Crantz). *Starch/Stärke* 39(4); 1987; 132-135

Ethanol production from fresh tubers, flour and starch of tapioca was studied by simultaneous saccharification and fermentation procedure. A 20% enzyme-liquefied slurry showed about 2-3% reducing sugars, which increased to 10% on enzymic saccharification for 4h. Alcoholic fermentation of this hydrolysate with *Saccharomyces cerevisiae*, var. *ellipsoideus*, yielded 8-9% alcohol showing about 95% fermentation efficiency. Large scale fermentation of tapioca flour by this process also showed fermentation efficiency of 90% thereby indicating the economic viability of the process. AS

Vegetables

Leafy vegetables

Lettuce

- 1840 Lipton (WJ). Carbon dioxide-induced injury of Romaine lettuce stored in controlled atmospheres. *HortScience* 22(3); 1987; 461-463

Romaine lettuce (*Lactuca sativa* L.) was stored for 2 wk at 0, 2.5, or 5 ° with oxygen/carbon dioxide (%) levels of 21/0 (air), 20/5, 20/7.5, 20/10, 20/15, 20/20, 20/30, 0.25/0, or 0.5/0. Controlled atm. combinations of 20/15, 20/20, and 20/30 resulted in brown, sunken patches on the green lamina at all temp. The 20/10 treatment induced this injury only at 0 and 2.5 °, whereas 20/7.5 induced it only at 0°. No injury developed in 20/5, or 21/0. Brown stain, a typical symptom of carbon dioxide injury on midribs of crisp head let-

tuce, was absent in 20/30, 20/20, 20/5, and 21/0, but developed in the other atm. mainly at 0°. Low levels of oxygen (0.5% or 2%) combined with 7.5% carbon dioxide did not consistently enhance sensitivity of Romaine to carbon dioxide injury. Stability was retained at least as well in Romaine stored at 0° or 2.5° in air as in any of the controlled atm. AS

Tomatoes

- 1841 Saltveit (MEJr) and Cabrera (RM). Tomato fruit temperature before chilling influences ripening after chilling. *HortScience* 22(3); 1987; 452-454

Tomato fruit (*Lycopersicon esculentum* Mill., cv. Castlemart) either harvested hot (e.g. 32 C) and chilled for 7 days at 7 C, or harvested cool (e.g., 19 C) and held in the laboratory at 37 for 7 h before chilling at 2.5 for 4 days ripened slower (a symptom of chilling injury) than fruit that were either harvested cool (19) or held at 12.5 for 7 h before chilling. AS

FRUITS

- 1842 Maroulis (ZB), Tsami (E), Marinos-Kouris (D) and Saravacos (GD). Application of the GAB model to the moisture sorption isotherms for dried fruits. *Journal of Food Engineering* 7(1); 1988; 63-78

In this paper the details of moisture adsorption isotherms for dried raisins, figs, prunes and apricots determined at 15, 30, 45 and 60 C using the gravimetric static equilibrium method have been described. The applicability of the GAB (Guggenheim-Anderson-deBoer) model to the experimental results was found to depend on the regression method employed. Using direct non-linear regression analysis five constants of the GAB model were estimated which enables the equilibrium moisture content of each dried fruit in the temp. range 15-60 C to be predicted with reasonable accuracy. The indirect (successive) non-linear regression method is not recommended since the basic three constants of the GAB equation are interrelated. NGKR

Citrus fruits

- 1843 Shomer (I). Protein self-encapsulation. A mechanism involved with colloidal flocculation in citrus fruit extracts. *Journal of the Science of Food and Agriculture* 42(1); 1988; 55-66

Cloud stability in citrus fruit aqueous peel extract (PEX) and the derived serum (SPEX) was studied with respect to endogenous coagulants and the possible involvement of soluble pectin as stabilising agent. Heat treatment of the pectin-degraded SPEX induced the appearance of turbidity as a result of protein coagulation, particularly in the pH range of 3.5-4.5, whereas only slight coagulation occurred without heat treatment. The pectin in non-degraded SPEX therefore inhibited heat coagulation of most of the protein present. Incubation

of PEX itself with exogenous depolymerising pectinase (DP) slightly increased its transmittance, and subsequent heat treatment clarified the suspension within a short time, especially at pH 2.5-4.5. Under the electron microscope, heat-coagulated proteins from DP-incubated SPEX appeared as dispersed amorphous bodies showing two main types of pattern; the coagulate from a PEX preparation of high oil content appeared as ultramicro-droplets of oil encapsulated within coagulated proteins. The evidence indicates that soluble pectin in PEX preparations affects cloud stability by preventing the coagulation of heat-denatured proteinaceous components; once the pectin is degraded by endogenous and exogenous DP, protein coagulation occurs rapidly on heat treatment, resulting in co-precipitation of the other encapsulated colloidal bodies. AS

Raisins

- 1844 Lagrange (V) and Payne (TJ). Shelf-life extension of food products containing raisins and raisin products. *Cereal Foods World* 33(2); 1988; 211-214

Use of raisin were reported to retard the mold growth and preserve the textural characteristics of bread during storage. BV

CONFECTIONERY, STARCH AND SUGAR

Confectionery

Chocolates

- 1845 Thomas (A). Chocolate panning. *Manufacturing Confectioner* 67(11); 1987; 39-45

Discusses chocolate panning process. Aspects covered include types of centers to be used, types of chocolate application methods, cool air temp. humidity control, and equipments. BV

Starch

- 1846 Abd Allah (MA), Foda (YH), Mahmoud (RM) and Abou Arab (AA). X-ray diffraction of starches isolated from yellow corn, sorghum, sordan and pearl millet. *Starch/Starke* 39(2); 1987; 40-42

X-ray analysis of starch isolated from yellow corn, sorghum (Giza 3 and 114) sordan 79 and pearl-millet was carried out. The calculated "d" spacing reinforced the pattern of diffraction as "A" type. The general pattern of the X-ray diffraction of the tested samples showed symmetric configuration with a specified diffracting angle for each sample. While no significant difference between the "d" spacing of the two types of sorghum Giza 3 and 114 was noticed, a sharp diffraction angle at "d" spacing of 5.9111 Å was observed in sordan 79.

AS

- 347 Bowler (P), Evers (AD) and Sargent (J). Dehydration artefacts in gelatinized starches. *Starch/Stärke* 39(2); 1987; 46-49

Scanning electron microscopy of swollen starch granule systems is valuable for interpretation of structural changes, but the results obtained must be interpreted with caution. The two major drying systems used, solvent exchange and lyophilization, both produce artefacts but of different types. The presence of pores on specimens prepared by lyophilization has often been interpreted as a true feature of the granule structure, but our experience suggests that this is incorrect. Furthermore we consider that the fibrillar structure present in preparations of lyophilized starch solubles results from ice crystal formation effectively concentrating, in the remainder of the solution, solute which is subsequently preserved as a dry web. AS

- 348 Chandrashekar (A), Somashekar (K) and Savitri (A). Optimal interference studies on single starch granules. *Starch/Stärke* 39(6); 1987; 195-197

Studies on the optical interference by potato, sorghum, wheat, pigeon pea and cowpea starch granules indicated that the potato granule was ordered mostly on the center of the granule and that the molecular arrangement of the birefringent portion was perpendicular to the radial. This was more so with the legume starches where the entire granule was ordered. Cereal starches had birefringent material on the periphery and non-birefringent material in the centre and in this case, the birefringent material was radially arranged. AS

- 349 Dias (FF) and Panchal (DC). Maltulose formation during saccharification of starch. *Starch/Stärke* 39(2); 1987; 64-66

Maltulose precursors are produced due to chemical isomerization of the reducing end glucose units during enzyme liquefaction and autoclaving of starch in the enzyme-enzyme process of glucose manufacture. The precursors are hydrolyzed during subsequent saccharification with amyloglycosidase to form maltulose as one of the products. Temp., pH and DE of the liquefied starch during autoclaving and Alpha-amylase treatment are important factors in controlling precursor formation, low temp., low pH and low DE resulting in less maltulose formation. Acid liquefaction prior to saccharification does not result in maltulose precursor formation. Blocking of the reducing end glucose unit by hydrogenation to sorbitol prevents the formation of maltulose; maltitol is produced instead. AS

- 350 Ishida (N), Kobayashi (T) and Kainuma (K). Studies on the physical state of water in starch gel. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi)' 35(2); 1988; 98-104 (Ja).

The behaviour of water in frozen starch gel during rewarming has been studied by differential scanning calorimetry. Potato and corn starch gels, containing 45% to 83% water were prepared at 80 C or 120 C. After cooling the gels to -50 C, DSC curves were obtained by heating at the rate of 2 C/min. The gelatinised starch below 60%

water showed two melting points of crystallised ice in the frozen starch gels. Ice from free water melted at about 0 °C while ice from restricted water melted below 0 °C. The melting point peak of restricted water changed its shape and peak temp. during storage at 5 °C. This phenomena depended on the type of starch, gelatinisation temp. and water content in the gels. The changing aspect of this peak in potato starch gel prepared at 80 °C were identical with those of corn starch gel prepared at 120 °C. BHS

- 1851 Maier (HG), Moritz (K) and Rummler (U). Thermostable binding of aroma compounds to starch. Part I. Binding by freeze-drying. *Starch/Stärke* 39(4); 1987; 126-131 (De).

By freeze-drying of aqueous emulsions or suspensions of menthol, pyrazine, thymol, vanillin, or peppermint oil and solutions of native or modified starches, amylose, amylopectin or Beta-cyclodextrin sorbates were prepared. After heating to 180 °C the aroma compounds were bound thermostable and in most cases also stable during extrusion. In general the adsorbed amounts decreased in the order cyclodextrin, amylose, potato starch, waxy maize starch, maize or tapioca starch, wheat starch, amylopectin. Some modified maize starches adsorbed greater amounts than native maize starch. Menthol and thymol were better bound to high-amylose starches, vanillin and pyrazine better to high-amylopectin starches, but vanillin best to cyclodextrin and pyrazine to maltodextrin (DE4-5). The desorption of the aroma compounds during chewing in the mouth was limited after formation of channel inclusion compounds with amylose. AS

- 1852 Richardson (SJ), Baianu (IC) and Steinberg (MP). Mobility of water in starch powders determined by nuclear magnetic resonance. *Starch/Stärke* 39(6); 1987; 198-203

The molecular mobility of water in corn starch powders (71 to 96% solids) was determined by deuterium (2H) and oxygen 17 (17O) high-field Nuclear Magnetic Resonance (NMR) spectroscopy, in deuterium (D2O) and oxygen-17 enriched water (H2 17O) resp. The NMR transverse relaxation rate (R2) was related to both the concn. and activity of water. The concn. plot showed two regions of water mobility, trapped and monolayer water. The water activity plot showed two linear regions of water mobility; Region A, from 0.99 to 0.23 water activity, and Region B, from 0.23 to 0.11 water activity. The linear relationship in Region A between water mobility, as measured by R2, and water activity is hypothesized to be due to the hydrophobic nature of the starch granules which results in diffusion limited water motion. Relaxation rates for H2 and 17 at high water activity were compared with one another and literature data. AS

- 1853 Schmidt (E) and Maier (HG). Thermostable binding of aroma compounds to starch. Part II. *Starch/Stärke* 39(6); 1987; 203-207

The formation of thermostable sorbates of menthol and starches, modified starches and Beta-cyclodextrin by autoclaving is described. The sorbed amount increases in general with the content of amylose. The max. was about 80 g/kg. With amylo maize starch (49% amylose) a 3

factorial design was carried out. The calculated max. of the sorption of menthol was 64.5 g/kg. The corresponding conditions were 163 C. 10 bar, 5 min. and 55% water. Reasons why increasing the temp. and decreasing the water content leads to lower sorbed amounts are discussed. AS

- 1854 Soni (PL) and Sharma (HW). The starch of *Cassimiroa edulis* - comparison with maize starch. *Starch/Stärke* 39(2); 1987; 43-46

Starch from the seed of *C. edulis* is isolated, purified and its physicochemical properties are compared with maize starch. Scanning electron microscopy of the granules show that they are either smaller round or polygonal in shape. It has low phosphorus and amylose content and water binding capacity while methanol soluble lipids and proteins are more than in maize starch. Gelatinization temp. and swelling power of *C. edulis* starch is almost comparable, but it has less solubility when compared with maize starch. Brabender viscosity shows high peak for *C. edulis* starch and lesser retrogradation. AS

Dextrins

- 1855 Pszezola (DE). Production and potential food applications of cyclodextrins. *Food Technology* 42(11); 1988; 96-100

Briefly discusses the history of cyclodextrins and their development properties complexation techniques, in particular on their potential applications controlling flavour release, masking odours and tastes, stabilizing emulsions, increasing foaming power, controlling or masking colour, and debittering of grapefruit juices modified forms of cyclodextrins and a more soluble Beta-cyclodextrin are also highlighted. BV

Sugar

Sucrose

- 1856 Toma (RB), Curtis (DJ) and Sobotor (C). Sucrose polyester. Its metabolic role and possible future applications. *Food Technology* 42(1); 1988; 93-95

Sucrose polyester may form a substitute for conventional fats in formulated foods without contributing calories to the food or compromising the taste or consistency of the food. This review covers benefits and problems associated with sucrose polyester. The effect of sucrose polyesters on plasma cholesterol, calorie reduction, fecal steroid excretion, gastrointestinal and fat-soluble vitamins is also discussed. 10 references. BV

Sugars

- 1857 de Bruijn (JM), Touwslager (F), Kieboom (APG) and van Bakkum (H). Alkaline degradation of monosaccharides. Part VIII. A ^{13}C NMR spectroscopic study. *Starch/Stärke* 39(2); 1987; 49-52

The analysis of alkaline degradation products of monosaccharides has been performed by ^{13}C NMR spectroscopy. The ^{13}C chemical shifts of several carboxylic acids produced by alkaline degradation of monosaccharides have been determined. The application of these data to the identification and quantification of products in an alkaline degradation mixture of D-glucose is presented. Carboxylic acid products up to 6 carbon atoms have easily been identified in such complex reaction mixtures. Furthermore, information on the different functional groups present in the oligomeric reaction products has been obtained from the alkaline degradation of ^{13}C D-glucose. AS

Sugarcane juice

- 1858 Tako (M), Nakamoto (K), Nakamura (S), Kohda (Y) and Nomura (D). Permeability of cane juice in ultra filtration membranes of acrylic vinyl co-polymer and cellulose acetate. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi)' 35(2); 1988; 120-125 (Ja).

The effects of membrane permeability on the flux and quality of raw and limed cane juice on ultrafiltration were studied by 2 - 3h long-term testing (of several types with mol. wt. cut-off levels from 50,000 to 100 000). The flux through XM-50, XM-100, and A-50 T membranes for raw juice remained at the value of about $0.100 \text{ ml cm}^{-2} \text{ min}^{-1}$ until permeation volume of 250 ml. but it then decreased gradually. The flux of A-50 T membrane was the greatest at the initial stage (with $0.140 \text{ ml cm}^{-2} \text{ min}^{-1}$), and then decreased gradually when juice limed to pH 8.1 at 10 C was used. The flux of juice limed at pH 7.0 at 85 C showed remarkably high value (at the initial stage), however, it decreased rapidly with increasing permeate volume. The flux of A-50 T membrane showed comparatively lower value than that of XM-membranes. The sucrose rejection of the permeate with the XM-50, XM-100 and A-50 T membranes was 2, 2 - 5 and 5 - 7% for juice limed to pH 7.0 at 85 C, resp. AS

BAKERY PRODUCTS

- 1859 Spicher (G) and Isfort (G). Causes of mould development on baked products. *Getreide, Mehl und Brot* 42(2); 1988; 57-60

Effect of fruit vinegars and diluted glacial acetic acid on the growth of some common molds on baked products are reported. Most of the causative molds (*Penicillium chrysogenum*, *P. crustosum*, *P. verrucosum*, var. *Cyclopium*, *P. frequentans*, *A. flavus*, *Eurotium amstelodami*, *E. chevalieri*) did not develop when the surface of the culture substrate was treated with $1.8 \text{ ml}/100 \text{ cm}^2$ of 5% 50.9 $\text{ml}/100 \text{ cm}^2$ of 8% vinegar. *Penicillium corylophilum* and *P. expansum* stopped growing at a dose of $1.8 \text{ ml}/100 \text{ cm}^2$ of 8% vinegar. *Penicillium roquiforti* and *P. varioti*, however, showed growth even at a treatment level of $1.8 \text{ ml}/100 \text{ cm}^2$ surface area with 10% vinegar. Wine-brandy-vinegar, fruit vinegar and diluted glacial acetic acid did not show any notable differences among themselves in their effect on the con-

trol of mold growth. SZA

Bread

- 1860 Musaiger (AO), Abu-Dagga (F) and Alloush (S). Nutrients composition of flours used in preparation of various breads in Bahrain. *Food Chemistry* 27(2); 1988; 107-113

The chemical and amino acid composition of various flour mixtures used in preparation of breads commercially produced in Bahrain have been determined in order to know the nutritive value of the flours used in Bahrain. The results showed that protein ranged from 9.5% to 10.3% and all flour mixtures had low levels of fibre (0.3-0.5%) indicating low extraction rates of flours used in preparing bread. Mineral compositions were also comparable except for K and P. The Na value of flour mixtures used in tanoor bread (7.7 mg/100 g) was found to be higher than that of other flour mixtures (3.1-4.0 mg/100g) possibly due to contamination of the flour with salt during blending process. However, no differences were observed in amino acid profiles and all flours had low levels of essential amino acids when compared to FAO/WHO reference protein. NGKR

- 1861 Ranhotra (GS), Gelroth (JA) and Bright (PH). Effect of the source of fiber in bread on intestinal responses and nutrient digestibilities. *Cereal Chemistry* 65(1); 1988; 9-12

Rat feeding trials were carried out with breads containing fiber originating from oat meal, corn, multigrain, cellulose bran and whole wheat along with a fiber free diet as control. The results showed that there was a significant increase in stomach and colon wt.s as well as three to six fold increase in fecal wt. having positive correlation with fecal output. The added cellulose was more resistant to colonic degradation than naturally occurring insoluble fiber but had lower fecal density on par with bran and whole wheat fiber. The degradation of fiber was highest (82.1%) on whole bread and least (15.9%) in cellulose containing bread. The fiber affected the apparent digestibility of N and fat and caused significant reduction in fecal pH. AR

- 1862 Seibel (W), Brummer (J-M) and Morgenstern (G). Proposals for the production of bread and rolls with whole wheat flour. *Korean Journal of Public Health* 42(2); 1988; 51-57

Recommendations on the formulations, preparation and processing for the production of bread and rolls from whole-wheat flour have been outlined. For a positive effect of oxidative treatment an intense kneading, the necessity of adding special additive like fat and DAWE-baking material (Diacetyl tartarate ester, in the case of rolls and other smaller baked products) and also the leavening constituent have been pointed out. In order to intensify the sensation of whole-wheat flour in the product, incorporation of wheat grits and flakes of oat, barley and rye are proposed. Retention of freshness and min. storage period of bread and rolls have been given. Alternate methods of formulation and production of bread from whole-wheat flour have been

described. Quality and baking behaviour of the commercial size whole-wheat flour is also reported. SZA

- 1863 Siljestrom (M), Bjorck (I), Eliasson (A-C), Lonner (C), Nyman (M) and Asp (N-G). Effects on polysaccharides during baking and storage of bread in vitro and in vivo studies. *Cereal Chemistry* 65(1); 1988; 1-8

The extent of staling of sour dough bread and conventional yeast bread with and without malt was evaluated by differential scanning calorimetry (DSC) during five days of storage. The susceptibility of starch to alpha-amylase was determined. The contents of resistant starch, soluble and insoluble dietary fiber and their effect on bulking capacity were determined. The in vitro susceptibility of starch to alpha-amylase was lower in sour dough bread than in the conventional bread. The sour dough fermentation had no effect on the contents of dietary fiber, but the starch availability was improved by predigestion with pepsin. Addition of malt flour resulted in a lower retrogradation of starch. The bulking capacity and protein utilisation were similar for both the types of bread. Thus, inclusion of malted flour reduced the staling in bread without affecting nutritional and other quality characteristics. AR

- 1864 Vora (HM) and Sidhu (JS). Effect of varying concentrations of ethyl alcohol and carbon dioxide on the shelf life of bread. *Chemie Mikrobiologie Technologie der Lebensmittel* 11(2); 1987; 56-59

The shelf life of sliced bread under room temp. can be extended for more than 3 wks by incorporating 1-2% ethanol (on loaf wt. basis) into the package or by packaging under carbon dioxide. The combination of carbon dioxide with 2% ethanol gives mould free shelf life of about 2 months. Sensory evaluation indicated softer in texture for ethanol treated bread. BV

Cakes

- 1865 Harris (CH) and Johnson (JM). Monitoring nonenzymatic browning in cakes prepared with high fructose corn syrup by high performance liquid chromatography. *Journal of Food Quality* 10(6); 1987; 417-424

This study was undertaken to utilize HPLC and colorimetric methodology to monitor specified products of nonenzymatic browning in cakes prepared with high fructose corn syrup (HFCS). In these studies the cakes were prepared with different concn. of HFCS as a sucrose replacement. Cream of tartar, an acidulant was used to alter the pH of the batter and reduce non-enzymatic browning. Total browning, HMF and furosine (a reducing sugar derivative) were analysed. The statistical analysis showed cakes prepared with different concn. of HFCS with and without an acidulant differ significantly among the treatments for HMF, furosine and total browning. NGKR

Pasta

- 1866 Park (CE), Szabo (R) and Jean (A). A survey of wet pasta packaged under a carbon dioxide:nitrogen (20:80) mixture for *Staphylococci* and

their enterotoxins. Canadian Institute of Food Science and Technology Journal 21(1); 1988; 109-111

Fifty samples of gas packed wet pasta products from five processors were analyzed for *S. aureus* and staphylococcal enterotoxins at time zero and at weekly intervals. Twelve % of fresh products were contaminated with *S. aureus* ranging from 10^2 to 10^5 cfu/g at 5 C, level decreased with storage time, and no enterotoxin was detected. After four wks. at 16 C, 22% of the samples had counts ranging from 10^3 to 10^7 g and 8% contained staphylococcal enterotoxin. The results show that proper refrigeration is essential to ensure safety to gas-packed wet pastas. BV

Tortillas

- 1867 Abbas (HK), Mirocha (CJ), Rosiles (R) and Carvajal (M). Decomposition of zearalenone and deoxynivalenol in the process of making tortillas from corn. Cereal Chemistry 65(1); 1988; 15-19

Tortilla dough (masa) was prepared from two samples of corn naturally contaminated with 0.23 and 4.23 p.p.m zearalenone, 3.28 and 12.26 p.p.m. deoxynivalenol (DON) and 1.49 and 9.83 p.p.m 15-acetyl deoxynivalenol (ADON) resp. Control corn samples were amended with 1 p.p.m and 5 p.p.m of zearalenone and 1, 5, and 10 p.p.m of DON. Lime water (2%) used to boil the corn contained (after boiling) trace amounts of trans-zearalenone but none of the other mycotoxins. The process of making tortillas from either contaminated or amended corn reduced significantly the levels of zearalenone and DON and destroyed 15 acetyl-DON completely, cis-zearalenone was detected only in tortillas made from corn heavily contaminated or amended (5 p.p.m) with zearalenone. The per cent reduction of the three mycotoxins during the preparation of tortillas ranged from 59 to 100% of zearalenone, 72 to 82% for DON, and 100% for 15-acetyl-DON. Because corn consumed by humans in most of Mexico and Latin America is largely in the form of tortillas, these findings may have some importance to public health. AS

- 1868 Serna-Saldivar (SO), Canett (R), Vargas (J), Gonzalez (M), Bedolla (S) and Medina (C). Effect of soybean and sesame addition on the nutritional value of maize and decorticated sorghum tortillas produced by extrusion cooking. Cereal Chemistry 65(1); 1988; 44-48

The effects of defatted soybean meal, full-fat sesame, and a mixture of soybean and sesame on the nutritional value of tortillas of maize (75%) and decorticated sorghum (25%) produced by extrusion cooking was studied. Decorticated red sorghum in raw and tortilla form had the best protein digestibility but the worst protein quality because of its poor essential amino acid pattern. Maize plus decorticated sorghum tortillas fortified with 8% soybean and 4% sesame had protein digestibility similar to unfortified tortillas but higher amounts of lysine, and, therefore, better chemical score, biological value, net protein utilization, and protein efficiency ratio. Addition of sesame (8%) did not increase protein quality ($P < 0.05$) or rat performance, but it did slightly increase gross energy. In vitro

protein digestibility and calculated protein efficiency ratio techniques were highly correlated with in vivo data. These assays can be used to predict the nutritional value of tortilla products. AS

- 1869 Sproule (AM), Saldivar (SO), Bockholt (AJ), Rooney (LW) and Knabe (DA). Nutritional evaluation of tortillas and tortilla chips from quality protein maize. *Cereal Foods World* 33(2); 1988; 233-236

Tortillas and tortilla chips with acceptable quality and a 50% improvement in nutritional value were made from quality protein maize (QPM). QPM had smaller, more dense, harder kernels than food grade maize. QPM contained twice as much lysine, tryptophan and albumins/globulins as food grade maize. Rats on QPM gained at least twice as much wt. as those on food grade maize and consequently had improved feed/gain ratios. Tortillas and tortilla chips of both maize genotypes had a significantly higher ($P < 0.05$) dry matter and energy digestibilities but lower ($P < 0.05$) apparent protein digestibilities than their respective raw grains. The data show that QPM can be processed into tortillas and tortilla chips with improved nutritional value. The development of acceptable QPM hybrids could improve the nutritional level of corn-based foods. AS

MILK AND DAIRY PRODUCTS

Milk

- 1870 Andrews (GR) and Morant (SV). Lactulose content, colour and the organoleptic assessment of ultra heat treated and sterilized milks. *Journal of Dairy Research* 54(4); 1987; 493-507
- 1871 Brady (MS) and Katz (SE). Antibiotic/antimicrobial residues in milk. *Journal of Food Protection* 51(1); 1988; 8-11

A qualitative receptor assay for antibiotic and antimicrobial residues in milk was used in a survey of commercial milk samples obtained in the eastern Pennsylvania, Central New Jersey, New York City area. Sixty-four milk samples were obtained over a 3-month period, representing different brands and bottling plants. Sixty three per cent of milk samples contained one or more residues; 27% contained 2 residues; 11% contained 3 or more residues. Tetracyclines and sulfonamides were the most predominant residues detected. A subsample of milk was used to confirm the qualitative presence of residues, using microbial assays. Of 9 presumptive tetracycline-positive samples, 9 were confirmed. Of 4 presumptive streptomycin-positive samples, 3 were confirmed. AS

- 1872 Christen (GL). A rapid method for measuring protease activity in milk using radiolabeled casein. *Journal of Dairy Science* 70(9); 1987; 1807-1814
- 1873 Marshall (VM). Fermented milks and their future trends, I. Microbiological aspects. *Journal of Dairy Research* 54(4); 1987; 559-574

Aspects covered include fermented milk products, nomenclature of the lactic acid bacteria, biochemistry of fermentation, and future development. BV

- 874 Pagnacco (G) and Caroli (A). Effect of casein and Beta-lactoglobulin genotypes on renneting properties of milks. *Journal of Dairy Research* 54(4); 1987; 479-485

The effects of Alpha , Beta, k-casein and Beta-lactoglobulin genetic variants on rennet clotting time, rate of curd firming and coagulum strength, measured on the individual milks of 306 Rendena cows by a lactodynamographic apparatus, were evaluated statistically, with simultaneous adjustment for environmental and physicochemical factors. The importance of genetic polymorphism was confirmed, especially for the main effects of casein loci: interaction among them was not found to be significant. For K-casein, BB genotype showed the best coagulation parameters lower rennet clotting time, a higher rate of curd firming and higher coagulum strength, with AB in an intermediate position for clotting time and rate of curd firming. However, for Alpha casein and Beta-casein dominance and overdominance effects between alleles were observed. Herd by genotype interaction was also found to be significant (herd by Beta-casein) or close to significance level (herd by K-casein). From the results of the analyses, suggestions for selection programmes have been made. AS

- 875 Rosenow (EM) and Marth (EH). Addition of cocoa powder, cane sugar, and carrageenan to milk enhances growth of *Listeria monocytogenes*. *Journal of Food Protection* 50(9); 1987; 726-729

Autoclaved samples of milk with 2% milkfat, 2% milk + sugar, 2% milk + cocoa, and 2% milk + sugar + cocoa were inoculated with one of two strains of *Listeria monocytogenes* and incubated at 13 C. Carrageenan was also added to one-half of all samples containing cocoa. Strain V 7 grew faster than strain CA in all products, with most rapid growth occurring in samples containing cocoa (with or without added sugar). Addition of carrageenan further reduced the generation time of this strain. The data suggest that sugar, cocoa and carrageenan when added to milk enhanced growth of *L. monocytogenes*. BV

- 876 Stanfield (JT), Wilson (CR), Andrews (WH) and Jackson (GJ). Potential role of refrigerated milk packaging in the transmission of Listeriosis and salmonellosis. *Journal of Food Protection* 50(9); 1987; 730-732

Unstressed cells of *Listeria* survived up to 14 days on the surfaces of waxed (1 serotype) and plastic (3 serotypes) containers. Heat-stressed cells of all three serotypes of *Listeria* survived for 2 d on both types of containers. One serotype survived for 4 d, but only on plastic containers. Unstressed cells of all three *Salmonella* strains survived up to 14 d on both types of containers. Heat-stressed *Salmonella* strains survived upto 2 d (waxed containers) and 4 d (plastic containers). BV

Skim milk

- 1877 Palanuk (SL) and Warthesen (JJ). The kinetics of lumichrome in skim milk using nonlinear regression analysis. *Food Chemistry* 27(2); 1988; 115-121

The kinetics of the formation and subsequent degradation of lumichrome a photodegradation product of riboflavin, were studied and correlated to that of riboflavin in skim milk. High performance liquid chromatography was used to monitor the riboflavin and lumichrome concn. and results showed that lumichrome concn. in skim milk increased and then levelled off with continued light exposure. A non-linear regression model was used to estimate the rates of lumichrome formation and degradation and it was seen that the yield of lumichrome conversion from riboflavin was estimated at 23% under the experimental conditions of this study. NGKR

Milk products

- 1878 Martel (R), N'Soukpoe-Kossi (CN), Paquin (P) and Leblanc (RM). Photoacoustic analysis of some milk products in ultraviolet and visible light. *Journal of Dairy Science* 70(9); 1987; 1822-1827

Butter

- 1879 McKellar (RC), Cholette (H) and Emmons (DB). Modification of the alkaline phosphatase assay for butter. *Canadian Institute of Food Science and Technology Journal* 21(1); 1988; 97-101

Butter manufactured from cream heated at 85 C was melted at 40 C, reactivation of alkaline phosphatase (AP) increased with time. Reactivation was not observed when a solid butter sample was added to pre-warmed assay butter. This was attributed to the high alkaline pH of the butter. This solid sample method was sensitive enough to detect 0.1% raw cream added to pasteurized cream. Reactivation was noted when butter was incubated for 1h at 30 C. The use of the solid sample method is recommended for routine analysis of alkaline phosphates in butter. BV

Cheese

- 1880 Beckers (HI), Soentoro (PSS) and Delfgou-van Asch (EHM). The occurrence of *Listeria monocytogenes* in soft cheeses and raw milk and its resistance to heat. *International Journal of Food Microbiology* 4(3); 1987; 249-256
- 1881 Feirtag (JM) and McKay (LL). Isolation of *Streptococcus lactis* C2 mutants selected for temperature sensitivity and potential use in cheese manufacture. *Journal of Dairy Science* 70(9); 1987; 1773-1778
- 1882 Garcia (MC), Otero (A), Garcia (ML) and Moreno (B). Microbiological quality and composition of two types of Spanish sheeps milk cheeses (Manchego and Burgos varieties). *Journal of Dairy Research* 54(4); 1987; 551-557

- 1883 Guillermo Oliver), de Giori (GS) and de Valdez (GF). Cheese industry development and research in Argentina. *CRC Critical Reviews in Food Science and Nutrition* 26(3); 1988; 225-241

- 1884 Khayat (FA), Bruhn (JC) and Richardson (GH). A survey of coliforms and *Staphylococcus aureus* in cheese using impedimetric and plate count methods. *Journal of Food Protection* 51(1); 1988; 53-55

A total of 256 cheese samples were analyzed for coliform plate count using violet red bile agar and for an impedance count using Bactometer. Coliform medium with a correlation coeff. between method of $R = -.91$. Fifty-four per cent of the samples contained 10^2 to 10^7 cfu/g. The highest counts were in cream and fresh cheese products. When 27 Cheddar cheese samples were inoculated with from 10^2 to 10^7 cfu of *Escherichia coli*/g a correlation of $R = -.97$ was found between methods. Two hundred of the cheese samples were analyzed for *Staphylococcus aureus* using Baird-Parker medium and impedance count using Bactometer *S. aureus* medium. Five samples (2%) contained over 10^3 cfu/g. The strains isolated were coagulase-positive. When 34 samples of cheese were inoculated with 10^2 to 10^3 cfu of staphylococci/g, the correlation between the plate and impedance method was $R = 0.98$. AS

Cheddar cheese

- 1885 Ng-Kwai Hang (KF), Moxley (JE), Marziali (AS). Cheddar cheese composition in some Quebec cheese factories. *Canadian Institute of Food Science and Technology Journal* 21(1); 1988; 80-83

Kareish cheese

- 1886 El-Zayat (AI) and Omar (MM). Kareish cheese prepared from ultrafiltered milk. *Journal of Dairy Research* 54(4); 1987; 545-550

Cheese made with the ultrafiltered milk(UF) had higher moisture, protein, fat, pH soluble N, non-protein N, amino acid N, tryptophan and free amino acids than the standard cheese. The microstructure of both types of cheese was very similar, while the organoleptic properties were more acceptable in the UF cheese. BV

Ice cream

- 1887 El-Neshawy (AA), Abdel Baky (AA), Rabie (AM) and Metwally (SA). Organoleptic and physical properties of ice cream made from hydrolysed lactose reconstituted milk. *Food Chemistry* 27(2); 1988; 83-93

Yoghurt

- 1888 McGregor (JU) and White (CH). Effect of sweeteners of major volatile compounds and flavour of yoghurt. *Journal of Dairy Science* 70(9); 1987; 1828-1834

Milk proteins

- 1889 Christen (GL) and Senica (M). Casein, fluorescein isothiocyanate as a substrate for measuring protease production by psychrotrophic bacteria. *Journal of Food Protection* 50(9); 1987; 744-749

Fluorescein isothiocyanate-labelled casein was evaluated as a substrate for measuring bacterial protease activity in milk. Using protease from *Bacillus amyloliquefaciens*, effects of substrate type, pH, temp. and enzyme concn. were determined. The procedure was sensitive to .012 unit of enzyme activity. The procedure was then used as a method to detect protease production by psychrotrophic bacteria growing in pasteurized skim milk at 7 C for 5 d. Three psychrotrophic bacteria were added at three different initial populations. Bacterial population, protease activity and cumulative free amino groups were monitored daily. Bacterial populations were not correlated with either protease activity or cumulative free amino groups. Protease activity and cumulative free amino groups were correlated ($r = .46$, $p = .001$). Both protease activity and cumulative free amino groups peaked as the microorganisms entered the late log phase (approx. 10^8 cfu/ml). This occurred after incubation for 2 d at 7 C in two replications and after 3 d in the third. Both values decreased with continued storage. AS

- 1890 Hoff (JE), Nielsen (SS), Peng (IC) and Chambers (JV). Ethanol extraction of lactose from non fat dry milk. Production of protein reffinate. *Journal of Dairy Science* 70(9); 1987; 1785-1796

- 1891 Singh (H) and Fox (PF). Heat stability of milk. Role of Beta-lactoglobulin in the pH-dependent dissociation of micellar k-casein. *Journal of Dairy Research* 54(4); 1987; 509-521

On heating casein micelle systems containing Beta-lactoglobulin (Beta-lg) at 90 C for 10 min. Beta -lg complexed with casein micelles at pH < 6.9 probably as a result of interaction with K-casein via sulphhydryl-disulphide interchange, and co-sedimented with the micelles on ultracentrifugation. Complex formation with Beta-lg appeared to prevent the dissociation of micellar K-casein on heating. However, at pH greater than or equal to 6.9 K-casein/Beta-lg complexes dissociated from the micelles on heating, thus enhancing the release of micellar K-casein. High concn. of Beta-lg (greater than or equal to 0.8%) induced coagulation at pH 7.3, essentially by promoting the dissociation of micellar k-casein. It appeared that Alpha - Alpha - Beta and k-caseins dissociated from serum protein-free casein micelles to equal extents, but the presence of Beta-lg specifically enhanced the dissociation of k-casein at pH values greater than or equal to 6.9. Micelle hydration increased slightly when casein micelles were heated in the presence of Beta-lg at pH 6.7, while at pH 7.3 Beta-lg decreased the degree of hydration of casein micelles. Formation of a complex between Beta-lg and k-casein appeared to stabilize the micelles in the pH range 6.5-6.7, possibly via increased micellar charge or degree of hydration or by preventing the dissociation of k-casein. AS

- 1892 Sundheim (G) and Bengtsson-Olivecrona (G). Hydrolysis of bovine milk fat globules by lipoprotein lipases: Inhibition by proteins extracted from milk fat globule membrane. *Journal of Dairy Science* 70(9); 1987;

1815-1821

MEAT AND POULTRY

Meat

- 1893 Burfoot (D) and James (SJ). The effect of spatial variations of heat transfer coefficient on meat processing times. *Journal of Food Engineering* 7(1); 1988; 41-61
- 1894 Carmen Ametrano Vidal (C) and Collins-Thompson (DL). Resistance and sensitivity of meat lactic acid bacteria to antibiotics. *Journal of Food Protection* 50(9); 1987; 737-740

Sixty-seven strains of lactic acid bacteria (LAB) isolated from raw ground pork and beef were studied. Morphological and biochemical studies enabled the strains to be classified in four broad groups. These were a typical streptobacteria, *Lactobacillus plantarum*, *Lactobacillus brevis* and *Leuconostoc mesenteroides*. Antibiotic resistance/sensitivity patterns of these strains to 17 common antibiotics are reported. All 67 strains were sensitive to penicillin, ampicillin, cephaloridine and erythromycin. Most strains were resistant to cloxacillin, methicillin, gentamicin, kanamycin, neomycin, streptomycin, tetracycline, polymyxin B, colistin, novobiocin, and bacitracin. Most strains were sensitive to chloramphenicol and rifampin. MIC studies on tetracycline and chloramphenicol resistant strains showed them to be highly resistant. Population studies of LAB in raw meat were shown to vary in tetracycline resistance (12-58% of total LAB as measured by MRS). AS

- 1895 Grant (GF), McCurdy (AR) and Osborne (AD). Bacterial greening in cured meats. A review. *Canadian Institute of Food Science and Technology Journal* 21(1); 1988; 50-56

This paper reviews bacterial greening in cured meats. Covers mechanism of bacterial greening, principal microorganisms involved in greening, detection of bacteria responsible for greening, processing factors influencing greening effect of pH, sodium nitrite, sodium chloride and water activity, smoking and cooking and possible preventive measures of green discoloration in cured meats. BV

- 1896 Kariel (B) and Pogorzelska (E). Improvement of *Salmonella* recovery from frozen ground meat by transfer of small volumes of pre-enriched samples. *International Journal of Food Microbiology* 5(1); 1987; 81-85
- 1897 Wedzicha (BL), Ladikos (D) and Dalgleish (DG). Kinetics of processes involved in the precipitation of myoglobin with acetone in the presence of phosphate buffer. *Food Chemistry* 27(1); 1988; 47-60

Kinetic measurements show that when acetone is mixed with buffered myoglobin (phosphate buffer 0.1M) the change in pH precedes other reactions which determine the yield of haem. The first order

rate constant for the release of haem from myoglobin in a medium prepared by mixing phosphate buffer (0.1M, pH 5-7) with acetone (final acetone content 72%) is 2.8 s^{-1} at 24 °C. The second-order rate constant for aggregation of myoglobin in the same medium is estimated to be of the order of $10^{-1} \text{ M}^{-1} \text{ s}^{-1}$. The relevance of these findings to an understanding of the factors underlying the extent of release of haem when myoglobin precipitates from buffered solution with acetone is discussed. UJSPR

Beef

- 1898 Anderson (ME), Hufi (HE), Naumann (HD), Marshall (RT), Damare (J), Johnston (R) and Pratt (M). Evaluation of swab and tissue excision methods for recovering microorganisms from washed and sanitized beef carcasses. *Journal of Food Protection* 50(9); 1987; 741-743
- 1899 Carr (TP) and Marchello (JA). Growth of aerobic psychrotrophs and colour changes of precooked beef slices as affected by packaging procedure. *Journal of Food Protection* 50(9); 1987; 733-736
- 1900 Gorska (I), Szmanko (T) and Krasnowska (G). Preliminary physico-chemical and histological characteristics of beef gullet meat tissue. *Food Chemistry* 27(2); 1988; 131-140

In this study the utilisation of unconventional offal as a substitute for processed beef has been discussed. The muscle layer of beef gullet meat tissue is made up of striated muscles and the tissue layer is composed of compact muscle bundles and the muscle fibres (43.3 min. thickness) are tightly joined by endomyosin. It was seen that the protein content of the gullet meat tissue is similar to that found in less valuable parts of meat and the muscles are high in collagen. It has also valuable sources of minerals and essential amino acids including high lysine content. NGKR

- 1901 Hawrysh (ZJ) and Wolfe (FH). Effects of a low-voltage rectal electrode system on beef quality from young and mature cows. *Canadian Journal of Animal Science* 67(3); 1987; 689-704
- 1902 Jones (SDM) and Robertson (WM). The effect of shrouding on the appearance of spray-chilled beef carcasses. *Canadian Institute of Food Science and Technology Journal* 21(1); 1988; 112-114
- 1903 Madden (RH). Vacuum packaging beef with carbon dioxide. *Food Trade Review* 57(11); 1987; 591-592
- 1904 Rhee (KS), Donnelly (KC) and Ziprin (YA). Reduction of mutagen formation in fried ground beef by glandless cottonseed flour. *Journal of Food Protection* 50(9); 1987; 753-755

Cattle

- 1905 Crouse (JD), Seideman (SC) and Cundiff (LV). The effect of carcass electrical stimulation on meat obtained from *Bos Indicus* and *Bos taurus* cattle. *Journal of Food Quality* 10(6); 1987; 407-416

Pork

- 1906 Jones (SDM), Murray (AC) and Robertson (WM). The effects of spray chilling pork carcasses on the shrinkage and quality of pork. *Canadian Institute of Food Science and Technology Journal* 21(1); 1988; 102-105
- 1907 Marriott (NG), Phelps (SK), Costello (CA) and Graham (PP). Restructured pork with texture variation. *Journal of Food Quality* 10(6); 1987; 425-435

This paper describes the effect of three different particle sizes on the acceptability of restructured chops manufactured from prerigor pork. Muscles were excised from the shoulders of U.S. No. 1 pork carcasses within 1 h. postmortem and samples were flaked as; small (head opening = 3.0 mm), medium (head opening = 6.1 mm) and large (head opening = 9.9 mm) with an urschel comitrol 3600. Samples were formulated with 1.0 NaCl and 0.25% sodium tripolyphosphate, converted into 19 mm thick restructured chops and packaged. Subjective evaluations were conducted after 5 and 56 days of frozen storage for colour, cohesiveness muscle cut resemblance, overall appearance, tenderness, juiciness, connective tissue amount and flavour. Objective measurements included Hunter colour values, shear force percentage cooking loss and TBA values. Results showed that large flaked particles contributed to improved colour and reduced cooking loss and particle size had no effect on muscle cut resemblance, overall appearance, juiciness and flavour. NGKR

Meat products

Frankfurters

- 1908 El-Refai (AA), Owon (MA) and Harras (AM). Utilization of cottonseed proteins in frankfurters. II. Cottonseed proteins as emulsion stabilizers in frankfurters. *Chemie Mikrobiologie Technologie der Lebensmittel* 11(2); 1987; 42-47

Cooked frankfurters with glanded or glandless cottonseed flour as protein additives showed higher quality than those containing soy flour or non fat dry milk. Organoleptic ratings and composite scores for glandless and glanded cottonseed flour were higher compared with those for soy flour and non fat dry milk as additives at a level of 30%. Overall satisfaction ratings revealed that frankfurters containing soy flour or nonfat dry milk were less satisfactory than those with cottonseed flour. BV

Sausages

- 1909 Reddy (BR), Terrell (RN), Dutson (TR), Smith (GC) and Savell (JW). Sodium acid pyrophosphate in linked sausages made with pork and/or goat meat. *Journal of Food Quality* 10(6); 1987; 437-443

This investigation was carried out to study the effects of using sodium acid pyrophosphate on chemical, physical and sensory properties of linked (SAPP) sausages made from pork and/or goat meat. Five com-

binations of pork and goat were used to formulate linked sausages in reciprocal increments of 25%. Each formulation was made with /without 0.25% SAPP stored in a retail case at 3 °C and sampled at 0, 3, 6, 9 and 12 days. Results showed that sausages made with 25 or 50% goat meat regardless of SAPP, were not different in off-flavours from sausages made with 100% pork and SAPP. It was found that SAPP decreased pH values, reduced percentages of cooking loss in 4 or 5 comparisons and slightly improved visual colour scores for sausages during initial storage periods of 0 and 3 days. NGKR

Poultry

Chickens

Broilers

- 1910 Van der Marel (GM), Van Logtestijn (JG) and Mossel (DAA). Bacteriological quality of broiler carcasses as affected by in-plant lactic acid decontamination. *International Journal of Food Microbiology* 6(1); 1988; 31-42

In an attempt to improve the bacteriological quality of broiler carcasses the bactericidal effect of treatments with 1% and 2% lactic acid was investigated. Bacterial colonisation was determined immediately after treatment, after the carcasses had been chilled and during storage at 0 °C. Examination included members of mesophilic aerobic and psychrotrophic aerobic colony-forming units (CFU), CFU of Enterobacteriaceae at 37 °C and CFU of *Staphylococcus aureus*. Immediately after treatment colonisation per gram skin was generally reduced by about 1 log. Initially 2% lactic acid was not found significantly more effective in reducing colony counts than 1%. However, treatment with 2% lactic acid suppressed post-decontamination colonisation with Enterobacteriaceae more effectively than 1% lactic acid, as determined after 15-18 days storage at about 0 °C. Lactic acid treatment was most effective when applied shortly before chilling. Successive treatment at three different stages during slaughtering did not increase reduction of colony counts. It is concluded that decontamination with 1-2% lactic acid at pH 2, when applied shortly before chilling, will markedly improve the bacterial safety and increase the refrigerated shelf life of broiler carcasses. AS

Hens

- 1911 Moran (ETJr), Poste (LM), McMillan (E), Patterson (C) and Revington (WH). Small-type tom turkeys versus heavy-type hens marketed at medium weight. Performance, carcass characteristics, sensory evaluation, and the effect of commercial basting of the breast with oil. *Canadian Journal of Animal Science* 67(3); 1987; 705-714

Small type toms were compared with heavy type hens with respect to attributes important to producer processor and consumer. MVG

Turkeys

- 1912 Shai Barbut Maurer (AJ), Lindsay (RC). Effects of partial sodium chloride replacement with other chloride salts on the physical and sensory properties of Turkey frankfurters. *Canadian Institute of Food Science and Technology Journal* 21(1); 1988; 90-96

Turkey frankfurters containing lower than usual sodium chloride levels were evaluated to determine the effects of decreasing or partially replacing salt in the formula on physical and sensory properties of the product. Replacement of half the NaCl with KCl in turkey frankfurters containing various total salt levels (2.5%, 2.0% and 1.5%) generally maintained product qualities. However, replacement of half the NaCl with MgCl significantly decreased emulsion stability and frankfurter firmness, plumpness, juiciness, and overall preference. Turkey frankfurters with 0.75% NaCl (70% NaCl reduction below the usual 2.5%), 0.75% KCl, and 0.4% phosphate were found to be as acceptable as the 2.5% NaCl reference product by a sensory evaluation panel. AS

Poultry products

Eggs

Egg products

- 1913 Ros (J). Egged on to better quality. *Food, Flavourings, Ingredients, Packaging and Processing* 10(3); 1988; 29-31

New laboratory techniques for controlling the quality of egg products have been developed. By checking egg products not only by conventional microbiological and chemical methods but also by new laboratory techniques such as the detn. of 3-hydroxy-butyric, lactic and succinic acids, the food processor of processed eggs has a useful insurance that the egg product being used is made from fresh, properly handled, stored and processed eggs. A specification for spray dried whole egg powder is given. SYR

SEAFOODS

- 1914 King (AH). Alginates and applications for new seafood products. *Activities Report* 39(2); 1987; 45-50
- 1915 Yambrach (FJ). Modified atmosphere storage of fresh seafoods. *Activities Report* 39(2); 1987; 40-44

Fish

- 1916 Klein (E) and Edelhauser (M). Determination of malachite green residues in edible fish by means of HPLC. *Deutsche Lebensmittel-Rundschau* 84(3); 1988; 77-79 (De).

The recovery of malachite green (Basic Green) in edible fish is over 70% and the limit of quantitative detn. is about 1 g/kg. BV

- 1917 Malle (P) and Tao (SH). Rapid quantitative determination of trimethylamine using steam distillation. *Journal of Food Protection* 50(9); 1987; 756-760

A simple, rapid and inexpensive method is proposed for detn. of trimethylamine (TMA) in fish muscle. It is possible to assay both the total volatile basic nitrogen (TVBN) and the TMA in less than 30 min. BV

- 1918 Sozuki (H), Hayakawa (S), Wada (S), Okuzumi (M) and Kikuchi (T). A simple method for determination of vitamin D and provitamin D in fish meat by high-performance liquid chromatography. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi)' 34(2); 1987; 94-97 (Ja).

A simple method for determining vitamin D and provitamin D in fish meat was developed by using high-performance liquid chromatography (HPLC) with UV detector (265 nm). After the crude fat extracted with chloroform methanol was saponified at room temp., the unsaponified fraction was subjected to HPLC. Vitamin D₂ and D₃ and provitamin D₂ and D₃ were separated on a column packed with an ODS using CH₃CN-MeOH (80:20) as an eluent. The trace amounts of vitamin D and provitamin D were found in mackerel and saury muscles. AS

Carp

- 1919 Hassan (IM). Processing of smoked common carp fish and its relation to some chemical, physical and organoleptic properties. *Food Chemistry* 27(2); 1988; 95-106

The objective of this study was to develop a suitable smoking process for common carp fish (*Cyprinus carpio*) to achieve more efficient utilisation of this newly introduced fishery resource in Egypt. The changes in the proximate composition, salt content and N compounds as well as water holding capacity and plasticity of fish tissues during processing to smoked products were investigated. These studies have been carried out using different brining and smoking conditions. The results showed that brining in 15% NaCl for 2 days at 4 °C followed by surface desalting in water for only 30 min. and partial natural drying at room temp. before cold smoking at 30-41 °C for 6 h proved to be the best conditions for the production of an acceptable smoked product. NGKR

Clupeids

- 1920 Balogun (AM). Effect of sundrying on the proximate composition and lipid characteristics of two freshwater clupeids. *Food Chemistry* 27(1); 1988; 1-11

The effects of sundrying on the nutrient composition and lipid characteristics of two fresh water species of clupeids (*Pellonula afzeliusi* and *Sierrathrisa leonensis*) were studied. The crude protein levels for fresh samples of *S. leonensis* and *P. afzeliusi* were found to be 14.1 plus or minus 1.0% and 16.0 plus or minus 1.1% resp. Sun-

dried samples of *S. leonensis* contained 62.1 plus or minus 3.2% protein, 11.0 plus or minus 1.0% lipid and 1.6 plus or minus 0.2% ash while *P. afzeliusi* contained 57.3 plus or minus 2.3% protein, 14.1 plus or minus 0.9% lipid, and 2.4 plus or minus 0.8% ash. Lipid characteristics showed that the lipids underwent lipolysis and autoxidation through sundrying. UJSPR

Cod

- 1921 Gow (JA) and Campbell (J). Cross reactivity of non-enteropathogenic serogroups with polyvalent antiserum while screening for enteropathogenic *Escherichia coli* in codfish and shellfish. *Canadian Institute of Food Science and Technology Journal* 21(1); 1988; 72-75

Lizard fish

- 1922 Yasui (A), Fujiwara (T), Lim (PY) and Ng (MG). Changes in properties of lizard fish meat as materials for fish jelly products during storage. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi)' 34(2); 1987; 109-114

Fish jelly products were prepared from whole lizard fish and leached meat stored in ice, and leached meat and Surimi stored at -20 C. K value, pH trimethylamine oxide-nitrogen (TMAON), dimethylamine-nitrogen (DMA-N), formaldehyde (FA), total volatile basic nitrogen (TVB-N) and viscosity of the meat were determined during storage. Gel-strength, folding test and organoleptic elasticity of jelly products prepared from the meat were measured. From these results, the available terms of ice stored whole fish, ice stored leached meat -20 C stored leached meat and -20 C stored Surimi for fish jelly products were estimated to be about 2-3 days, about 1 wk less than 1 wk and more than 1 month, resp. Frozen surimi containing 3% sucrose and 0.2% polyphosphate can be available for relatively long period as materials for jelly products. AS

Red fish

- 1923 Ochlenhclager (J) and Schreiber (W). Changes in lipid class composition of red fish (*Sebaster marinus*) during frozen storage. *FAT Science and Technology* 90(1); 1988; 38-41 (De).

Single redfish fillets from interleaf blocks made on board a commercial trawler were frozen stored at three different temp. (-10 C, -20 C, -30 C), and investigated in time intervals for their lipid composition. Free fatty acids increased rapidly at -10 C while their formation mainly from phospholipids was almost inhibited at -30 C. AS

Trouts

- 1924 Dawood (AA), Karkalas (J), Roy (RN) and Williams (CS). The occurrence of non-volatile amines in chilled-stored rainbow trout (*Salmo irideus*). Food Chemistry 27(1); 1988; 33-45

The effect of holding freshly caught whole rainbow trout (*Salmo irideus*) at 0, 10, 20 and 30 °C for a period of 6 h prior to chilled storage was studied. Whole and eviscerated samples were analysed for putrescine, cadaverine, histamine, spermidine and spermine by high-performance liquid chromatography (HPLC) of their benzoyl derivatives after 2, 4, 7, 10 and 14 days of storage at 0 °C. The concn. of putrescine, cadaverine and histamine increased during storage, while those of spermidine and spermine decreased after an initial rise during the first 4 days. Tyramine was not detected in any of the samples. In general, holding of the samples at temp. above 0 °C for 6 h prior to chilling gave rise to increased concn. of non-volatile amines. Eviscerated fish contained lower concn. of amines than whole samples. Evidence is provided that the concn. of putrescine, and possibly that of cadaverine and histamine, in the flesh of chilled-stored rainbow trout, can be used as a criterion for the assessment of the freshness of the fish. AS

PROTEIN FOODS

Infant foods

- 1925 Meyer (DH), Kunin (AS), Maddalena (J) and Meyer (WL). Ribonuclease activity and isoenzymes in raw and processed cows' milk and infant formulas. Journal of Dairy Science 70(9); 1987; 1797-1803
- 1926 Pompei (C), Rossi (M) and Mare (F). Protein quality in commercial milk-based infant formulas. Journal of Food Quality 10(6); 1987; 375-391

In this paper the findings of an investigation for evaluating the protein quality of various market samples infant milk food due to the differences in the manufacturing techniques and the ingredients used which are effected by the heat treatment is studied. The parameters evaluated in this study were total hydroxy methyl furfural, protein reducing substances, lysinoalanine, available lysine, tyrosine, chemical score in vitro protein digestibility, PER and the whey protein/casein ratio. It was found that lysinoalanine content was found to be one of the indices most sensitive to heat damage undergone by the product and is directly related linearly to total hydroxy methyl furfural and protein reducing substances. Various formulations were compared by Quantitative Descriptive Analysis (QDA). The results revealed a modest difference, between powdered and liquid formulations with QDA score of 4.94 and 5.16 resp. and powdered formulations however, seem to have more constant quality than liquid formulations. NGKR

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Alcoholic beverages

Beer

- 1927 Bloeck (S), Kreis (A) and Stanek (O). Quantitative determination of C7 to C14 carbonyl compounds in beer in the middle and upper p.p.t range by means of gas-liquid desorption. *Deutsche Lebensmittel-Rundschau* 84(1); 1988; 5-8 (De).

This paper reports a method to conc. carbonyls out of beer by means of gas-liquid desorption, their derivatisation on to 2,4 dinitrophenyl hydrazones, isolation through aluminium oxide and analytical separation by means of HPLC. The quantitative detection limit is in the middle and upper p.p.t range. BV

Beer

- 1928 Boughton (R). Practically managing yeast. *Technical Quarterly, Master Brewers' Association of the Americas* 24(4); 1987; 133-136

Highlights practical elements of yeast management to ensure beer quality of highest standards. Yeast culture, handling, storage and waste yeast and beer recovery are discussed. BV

- 1929 Kimura (Y), Hashimoto (N), Nagashima (Y) and Yosioka (K). Systematic design of flavour quality of a light beer-"Kirin beer light". *Technical Quarterly, Master Brewers' Association of the Americas* 24(4); 1987; 140-145

- 1930 Nout (MJR). Chemical composition and nutrient balance of busaa a Kenyan opaque maize beer. *Chemie Mikrobiologie Technologis der Lebensmittel* 11(2); 1987; 51-55

Busaa, a Kenyan opaque maize beer showed a significant increase in Fe, vitamin B2 and Vitamin B12 and pantothenic acid by the traditional manufacturing process but losses of protein, energy, P, Ca, Vitamin B1, and niacin were observed. BV

Non-alcoholic beverages

Coffee

- 1931 Scholz (E). Karl Fischer titration in boiling methanol-water determination in roast coffee. *Deutsche Lebensmittel-Rundschau* 84(3); 1988; 80-82 (De).

Extracting ground coffee with boiling methanol, the water is released slowly and incompletely and the water content found by successive KF titration is too low. Extracting and titrating simultaneously, in boiling methanol gives accurate and reliable

results. AS

Fruit juices

Apple juices

- 1932 Kakiuchi (N), Moriguchi (S), Ichimura (N), Kato (Y) and Banaba (Y). Changes in the composition and amounts of volatile compounds of apple juice associated with thermal processing. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi)' 34(2); 1987; 115-122

Studies were undertaken to analyse the changes in the composition and concn. of volatile compounds after thermal processing of apple juice and to evaluate the suitability for processing of five main cvs. in Japan. Juice yield of the cvs. examined ranged from 65.7% in 'Kogyoku' to 77.2% in 'Hatsuaki' throughout the processing. Seventy to 80 kinds of volatile compounds were detected in chromatographic peaks of which 39 compounds were identified by gas chromatography mass spectrometry. The compounds of each class included 27 kinds of esters, 6 of alcohols, 2 of aldehydes, 2 of hydrocarbons, a phenol and an acid. Average percentage of retention of each class of volatile compounds of the five cvs. was highest. 71.9% for the alcohols followed by 50.7% for the esters and 30.5% for the aldehydes. Total amounts of volatile compounds recovered after thermal processing were highest in the cv. 'Kogyoku' amounting to 7.58 p.p.m followed by 'Hatsuaki' with 5.83 p.p.m 'Mutsu' 3.20 p.p.m. 'Golden Delicious' 1.44 p.p.m. and lastly 'Fuji' with 1.41 p.p.m. From these results, it was apparent that the higher concn. of volatile compounds in the juice of cvs. 'Kogyoku' and related cvs. 'Hatsuaki' after thermal processing, accounted the higher suitability of juice making of these cvs. AS

- 1933 Paton (D), Hamilton (HA) and Timbers (GE). An assessment of oat hulls as press aid for the apple juice processing industry. *Canadian Institute of Food Science and Technology Journal* 21(1); 1988; 76-79

The use and suitability of oat hulls as a press aid and consequently as a partial replacement of rice hulls is investigated. BV

Tea

- 1934 Hall (MN), Robertson (A) and Scotter (CNG). Near-infrared reflectance prediction of quality, theaflavin content and moisture content of black tea. *Food Chemistry* 27(1); 1988; 61-75

Studies on a total of 134 black teas of wide-ranging type, origin and quality have indicated that the moisture content, theaflavin content and tea tasters' assessment of overall quality can be successfully estimated by near-infrared reflectance (NIRS) spectroscopy. Using the Neotec Compscan 7000 system, prediction equations have been derived on unground tea leaves. Moisture content was predicted with SEP 0.39% over a range of 8.9% to 17.3% using three

linearly summed terms. Total theaflavins, in the range 1.5 to 26.5 μ mol./g, was estimated (two-term equation) with a standard error of 3.3 mol./g. Overall quality scored by five tasters, over a range of 25 to 74, was predicted by a two-term equation with an accuracy of plus or minus 15.6. This accuracy is favourably comparable to that achieved by one taster predicting the mean score of four others. AS

FATS AND OILS

Fats

- 935 Dobarganes (M C) and Perez-Camino (MC). Systematic evaluation of heated fats based on quantitative analytical methods. *Journal of the American Oil Chemists' Society* 65(1); 1988; 101-105

Palm, olive, sunflower and soybean oils were evaluated before and after heating them for 100 h at 195 C. Analytical detn. of non polar and polar triglycerides and their methyl esters including fatty acid composition of these oils permitted the distinction of three types of degradation-oxidative, thermal and hydrolytic. MNK

- 936 Perkins (EG) and Pinter (S). Studies on the concentration of oxidised components of abused fats and the application of HPLC to their separation. *Journal of the American Oil Chemists' Society* 65(5); 1988; 783-787

HPLC system developed to partially separate or 'profile' the oxidised products used on octadecyl bonded phase column and a linear gradient from 50% aqueous acetonitrile to 85% aqueous acetonitrile. The resultant chromatograms can be useful in assessing the quality of used fats. MNK

Lipids

- 937 Komaitis (ME), Revinthi-Moraiti (K) and Evangelatos (G). The lipid composition of fresh *Origanum dictamnus* leaves. *Food Chemistry* 27(1); 1988; 25-32

The components of the lipid fraction of fresh leaves of *Origanum dictamnus* L. have been identified by means of chromatographic techniques. The non-polar lipids identified were; sterols, steryl esters, free fatty acids, fatty alcohols, triglycerides, waxes, hydrocarbons, carvacrol, esters and triterpenic acids. The following polar lipids were also identified: mono-, di-, and polygalactosyl, diglycerides, sulpholipids, cerebrosides, phosphatidylethanolamine, phosphatidylserine, phosphatidyl-glycerol, phosphatidylinositol and phosphatidylcholine. No phosphatidic acid was detected. AS

- 938 Neff (WE), Frankel (EN) and Fujimoto (K). Autoxidative dimerization of methyl linolenate and its monohydroperoxides, hydroperoxy epidioxides and dihydroperoxides. *Journal of the American Oil Chemists' Society* 65(4); 1988; 616-623

The structure of dimers and oligomers produced by autoxidation of methyl linolenate and its purified oxidation products were investigated to obtain a better understanding of the mechanisms of oxidative deterioration of unsaturated lipids. MNK

Oils

- 1939 Abraham (G), Hron (RJSr) and Koltun (SP). Modeling the solvent extraction of oilseeds. *Journal of the American Oil Chemists' Society* 65(1); 1968; 129-135

A computer model and an experimental procedure for generating data needed in the model have been developed for the oilseed extraction process. The experiments are relatively simple and are performed with a bench-top extractor. Experimental results and modeling calculations are presented for the extraction of cottonseed using hexane, isopropanol and ethanol. The calculations show that in an alcohol extraction using a chill separation, isopropanol's greater oil miscibility allows for a lower solvent-to-feed ratio than does ethanol. Using the latter solvent, however, achieves lower residual lipids in the extracted meal because recycled ethanol contains less oil than recycled isopropanol. AS

- 1940 LaBarge (RG). The search for a low-caloric oil. *Food Technology* 42(1); 1988; 84, 86-88, 90

Various approaches and products have been considered for substituting or to reduce the fat content of foods. Water soluble compounds (polydextrin, N-oil, and maltodextrins) triglyceride modification, polycarboxylic acid esters, sterically hindered esters, medium chain triglycerides and polyglycerins ethers, and other approaches are discussed for replacement or reduction of fat content in foods. BV

- 1941 Pardun (H). Deodorization of edible oils in laboratory scale. *FAT Science and Technology* 90(1); 1988; 5-14 (De).

After a description of the most important older American orders for deodorization of oils in laboratory scale two laboratory deodorization aggregates, constructed by the author, are represented. The older one, planned for 300 g oil, was fitted above all to make evident the dependence of the efficiency of this laboratory device on the construction elements. It was also possible to prove by its aid that the so called volume theory of the discontinuous deodorization is only partly valid. The newer deodorizer construction for oil amounts of 50 g permits to ascertain already in laboratory the optimal parameters for semi continuous process deodorization in the temp. range from 190 to 270 °C. The temp. limit which should not be depassed during deodorization could be investigated in connection with the detn. of the oxidation coeff. Thus unreparable damages of the substrate should be avoided. The device planned for 50 g is also fitted for quality evaluation of oils and fats with unknown antecedents. AS

- 1942 Tikkoo (AK), Agrawal (US), Gupta (DK) and Singh (BPN). An Analysis of some features of oil expeller. *Indian Food Industry* 6(4); 1987; 166-170

An analysis of mechanical oil expellers available in India on their capacity, power rating, wt. and cost of thirty eight models based on the literature supplied by the manufacturers. Power rating, wt. and cost were linearly related to capacity which support the trend for popularity of small capacity models. The power ratings of Indian expellers are comparable to those of European models. BV

Blackcurrent oils

- 1943 Traitler (H), Wille (HJ) and Studer (A). Fractionation of blackcurrent seed oil. *Journal of the American Oil Chemists' Society* 65(5); 1988; 755-760

Blackcurrent seed oil is known to be one of the richest source of linolenic acid, with values of up to 20% of this acid. Different fractionation techniques have been evaluated to separate linolenic acid from other fatty acids in the oil in particular from linolenic acid. MNK

Essential oils

- 1944 Lawrence (BM). Progress in essential oils. *Perfumer & Flavorist* 13(2); 1988; 67-76

Covers bergamot oil, caraway oil and jasmin extracts. BV

Fish oil

- 1945 Angelo (AJ), Dupuy (HP) and Flick (GJJr). Investigation of fish oil quality by direct capillary gas chromatography. *Journal of Food Quality* 10(6); 1987; 393-405

This paper describes a simple, rapid method to resolve and identify volatile compounds that can be used to assess the quality of pond-raised catfish and crude and refined fish oils by GC/MS along with a commercial sample of fish oil sold as a source of omega-3 fatty acids. It was seen that major volatile compounds that can be used as markers to assess the quality were: pentane, heptane, pentanal, hexanal, pentylfuran, hepatadienals nonanal decanal and decadienals. This method was found to be useful to investigate off-flavours caused by handling, processing and storage. NGKR

Palm oils

- 1946 Augustin (MA) and Chong (CL). Effect of iron (III) palmitate on the oxidation of palm oil. *Food Chemistry* 27(2); 1988; 123-129

In this work the effect of added Fe (III) palmitate on the rate of oxidation of refined, bleached and deodourised palm oil was studied. The quality assessment has been determined by peroxide,

P-anisidine values and UV absorbance values at 233 and 269 nm. The results showed that the rates of increase in peroxide values and UV absorbance at 233 nm in oils without added Fe (III) palmitate were found to be greater than those for oils with added

- 1947 Berger (KG). Palm oil. Chemistry and Industry (24); 1987; 846-851

Covers exports, development of production, current and future export markets, palm oil in vanaspati, analytical research, oleochemicals from palm oil, and quality of transport conditions. BV

Palm Oils

- 1948 Ukhun (ME). Palm oil. Fatty acid profile and effects of selected antioxidants in freeze-dried model systems. Human Nutrition: Food Sciences and Nutrition 41F(2); 1987; 113-119

The dominant fatty acid in the palm oil investigated in this study were palmitic acid (47.5%) and oleic acid (37.3%). The effects of one synthetic antioxidant butylated hydroxyanisole (BHA) and two natural antioxidants hydrolyzed vegetable protein (HVP) and autolyzed yeast protein (AYP) on the stability of the palm oil in a freeze-dried model system were also investigated. Using induction periods as indices of stability to oxidation, improvements in the stability of the palm oil were obtained with varying levels of BHA, HVP and AYP in the model system. Synergism among these antioxidants was also demonstrated. AS

Rice bran oils

- 1949 Takano (K), Kamoi (I) and Obara (T). Purification and properties of rice bran phospholipid acylhydrolase. Journal of Japanese Society of Food Science and Technology '(Nippon Shokuhin Kogyo Gakkaishi)' 34(2); 1987; 77-82

Two phospholipid acylhydrolases of pI 5.4 and 9.5 in rice bran were purified by precipitation with ammonium sulphate and column chromatography on n-decylamine-Sepharose 4B, phosphatidylcholine AH Sepharose 4B and isoelectric focusing, up to the specific activity of 119 and 953 fold, resp. The main phospholipid acylhydrolase (pI 9.5) showed estimated mol. wt. of about 40,000 when determined by gel filtration on a TOYOPEARL HW-50F column. The enzyme had optimum pH of 8.0-9.0 and showed the highest activity at 37 °C. There was an obligatory requirement of calcium ion and 0.2 mM of calcium ion was essential for maximal activity. It was stable below pH 8.0 and 30 °C inhibited by Al^{3+} , Co^{2+} , Cu^{2+} and EDTA. AS

- 1950 Taniguchi (M), Tsuji (T), Morimoto (H), Shibata (M) and Kobayashi (K). Treatment of rice bran with supercritical carbon dioxide. Journal of Japanese Society of Food Science and Technology '(Nippon Shokuhin Kogyo Gakkaishi)' 34(2); 1987; 102-108

Three kinds of rice bran, Aka, Naka, and Shiro brans were defatted by extraction with supercritical carbon dioxide (SC-carbon

dioxide). More than 80% of crude fat of the Aka bran was extracted with SC-carbon dioxide at 200 atm and 40 C. The oil extracted with SC-carbon dioxide was lighter in colour and contained less P than that extracted with hexane. Oryzanol was found to be extracted from rice bran with SC-carbon dioxide. AS

Soybean oils

- 1951 Frankel (EN), Warner (K) and Klein (BP). Flavour and oxidative stability of oil processed from null lipoxygenase-1 soybeans. *Journal of the American Oil Chemists' Society* 65(1); 1988; 147-150

The role played by lipoxygenase in the flavour quality of soybean oil was investigated by comparing the oil processed from special soybeans lacking lipoxygenase-1 (Forrest x P.I. 408251) with the oil from normal (Century) beans. Quality assessment was based on sensory evaluations and on capillary gas chromatographic (GC) analyses of volatiles of the extracted crude, partially processed, and refined, bleached and deodorized oils. In direct comparisons of oil products from the two types of beans, no significant differences were found in either flavour quality or in flavour stability based on total volatiles, and in analyses for 2, 4-decadienal. Although thermal tempering did not significantly affect the initial flavour scores of crude and degummed oils from Century and low L-1 soybeans, the initial scores of refined and bleached oils from Century soybeans were significantly improved by this treatment. Similarly, thermal tempering was just as important in producing good quality flour from the special beans lacking lipoxygenase-1 as the flour from normal beans. Therefore, factors other than lipoxygenase-1 appear to affect the food quality of soybean oils and meals. AS

- 1952 Mounts (TL), Warner (K), List (GR), Kleiman (R), Fehr (WR), Hammond (EG) and Wilcox (JR). Effect of altered fatty acid composition on soybean oil stability. *Journal of the American Oil Chemists' Society* 65(4); 1988; 624-627

Crude oils extracted from the seeds of three genotypes of altered fatty acid composition were processed in laboratory to finished deodorised oils. Analysis of the fatty acid composition of the three oils showed the linolenic acid content to be 3.3%, 4.2% and 4.8%. The stability of these oils was compared to that of oil from a soybean var. having linolenic acid of 7.7% and of a commercial hydrogenated winterised oil with linolenic acid of 3.0%. Compared to control oils, the test oils had improved overall room odour intensity scores and lacked the fishy odour. MNK

SPICES AND CONDIMENTS

Condiments

- 1953 Ekundayo (CA). Mycoflora and vitamin content of sun-dried food condiments in Nigeria. *Qualitas Plantarum - Plant Foods for Human Nutrition*

37(3); 1987; 247-252

The fungi most frequently isolated (Of 20-100% incidence) from fresh okra, pepper fruits and melon seeds are *Botryodiplodia theobromae*, *Rhizopus stolonifer*, *Trichoderma harzianum*, *Mucor mucedo* and *Fusarium oxysporum*. The major mycoflora of the fruits which had been sun-dried for twenty days are comprised of *Aspergillus* spp and *Penicillium* spp which initially had formed the minor components (Of less than 20% incidence) of the colonising population. The effect of sun-drying on the fruits was a statistically significant ($P = 0.05$) decrease in the riboflavin content and a generally small and non-significant decrease in the concn. of thiamine, niacin, biotin and ascorbic acid. The effect of mouldiness during sun-drying was to further decrease the concn. of the vitamins. AS

Seasonings

- 1954 Miura (M), Nishiyama (K), Katsuragi (T) and Akatsuka (S). Preparation of new seasoning by hydrolysis of mixture of animal and plant protein materials. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi') 34(2); 1987; 98-101 (Ja).

Animal and plant protein-derived seasoning was intended to develop. On preparation of the seasoning it was intended that the salt content should be 8 to 9 times the total nitrogen content and the formal nitrogen content should be approx. 60% of the total nitrogen content in order to characterize with the mild taste of peptides. The mixture of bonito meal and soybean meal was hydrolyzed with hydrochloric acid at 120 C, neutralized to pH 5.0 with sodium carbonate and filtered. The filtrate was used for analysis and sensory test as the seasoning sample. The appropriate condition of preparation was as follows. bonito meal:soybean meal 4:6, 3 times amount. 4.5 N hydrochloric acid and 12 h hydrolysis. The seasoning sample thus prepared gave distinctively rich taste and flavour, which were further improved by the treatment with 0.05 to 0.1% amount of active carbon. Light yellow powder product with good reconstitution properties was obtained by spray drying. AS

SENSORY EVALUATION

- 1955 Basker (D). Critical values of differences among rank sums for multiple comparisons. *Food Technology* 42(2); 1988; 79-84
- 1956 Labuza (TP) and Schmidl (MK). Use of sensory data in the shelf life testing of foods. Principles and graphical methods of evaluation. *Cereal Foods World* 33(2); 1988; 193-206

The authors have reviewed in detail the different sensory tests including the graphical methods to determine the shelf life of foods. They conclude that simple graphical methods or techniques can be used with traditional different methods of sensory tests to evaluate the shelf life of foods. PHR

FOOD STORAGE

- 1957 Reichmuth (Ch). Experiences with an inert atmosphere for fighting against insects in stored grain. *Getreide, Mehl und Brot* 42(2); 1988; 38, 39-43 (De).

Laboratory, large-scale and field level experiments have shown that with N or carbon dioxide atm. or reduced O levels, total destruction of 4 types of storage insects (*Ephestia cautella*, *Plodia interpunctella*, *Tribolium confusum*, *Oryzaephilus surinamensis*) could be achieved by an effective treatment period upto 14 days. Grain weevil (*Sitophilus granarius*) and its young ones, however, required a min. 3-fold of this period at 20 °C and 4-folds at 15 °C for effective destruction. The O content in the atm. of storage warehouse is brought down by the treatment of N to < 4 vol. %, and with carbon dioxide to < 6%. It could be maintained low with further successive dosage of the concerned gas. In silos which were not specially sealed, it was necessary to flush with 3 m³/N/h or 2.5 m³ carbon dioxide/h. By improving the sealing of silos, the gas throughout could be markedly reduced. SZA

INFESTATION CONTROL AND PESTICIDES

Infestation control

Insects

Manduca sexta

- 1958 Martin (MM) and Vant Hof (HM). The cause of reduced growth of *Manduca sexta* larvae on a low water diet. Increased metabolic processing costs or nutrient limitation. *Journal of Insect Physiology* 34(6); 1988; 515-525

The growth rate and nitrogen accumulation rate are lower in third-instar, *Manduca sexta* larvae on an artificial diet containing 65% water than on one containing 82% water. This is due to reduced efficiency of conversion of digested N into larval biomass. Further, the uric acid production is 2 to 25 times greater and non-feeding respiration rates 16.0% higher in the larvae on the low-water diet. Food is the major source of water for the larvae, with metabolic water making only a minor contribution to water input. Larvae from the low-water diet retain and use a higher percentage of the water they gain than larvae from the high water diet (49.4% vs 41.9%). The larvae from low water diet synthesis 70% more new, fully hydrated tissue from a given amount of water than from the high water diet. The reduced growth and reduced efficiency of conversion of digested food on low water diets are due to limitation in the amount of water available for the synthesis of new hydrated tissue. KMA

Insects

Sitotroga cerealella

- 1959 Ismail (II), El-Nahal (AKM), Kamel (AH) and Mostafa (TM). Effect of gamma radiation on the different stages of the angoumois grain moth, *Sitotroga cerealella* (Olivier) (Lepidoptera: Gelechiidae). *Insect Science and its Application* 8(3); 1987; 327-329

Physical means of controlling the different stages of *Sitotroga cerealella* in wheat was studied. The values of gamma radiation LD are; adults (190, 100 krad for females and 183.200 krad female pupae (6.039 krad), 3 days old eggs (5.570 krad), one wk old larvae (4.800 krad), 1-day-old eggs (4.181 krad) and 2 wk old larvae (3.056 krad). BV

Pesticides

- 1960 Deshmukh (PB) and Renapurkar (DM). Insect growth regulatory activity of some indigenous plant extracts. *Insect Science and its Application* 8(1); 1987; 81-83

BIOCHEMISTRY AND NUTRITION

Biochemistry

- 1961 Calam (J), Bojarski (JC) and Springer (CJ). Raw soybean flour increases cholecystokinin release in man. *British Journal of Nutrition* 58(2); 1987; 175-179

The aim of the present study is to determine whether oral ingestion of raw soybean flour, which contains trypsin inhibitors, alters the release of cholecysto kinin (CCK) in man. Ingestion of raw soybean flour increases CCK release in man and that heat treated flour with reduced trypsin inhibitor content of the flour also diminishes its CCK releasing effect. BV

- 1962 Jaskiewicz (K), Weight (MJ), Christopher (KJ), Benade (AJS) and Kritchevsky (D). A comparison of the effects of soybean protein and casein on bile composition, cholelithiasis and serum lipoprotein lipids in the vervet monkey (*Cercopithecus aethiops*). *British Journal of Nutrition* 58(2); 1987; 257-263

- 1963 Lassek (E) and Montag (A). Nucleic acid contents in foodstuffs made from yeast and microalgae. *Deutsche Lebensmittel-Rundschau* 84(3); 1988; 69-72 (De).

The content of RNA in pure yeast products(yeast flakes, powder, in bread spreads made of yeast extract or with yeast extract added, and in broths and condiments containing yeast extract) was about 50 g/kg of DM. and DNA contents was about 5 g/kg of DM in micro-algae products (tablets) RNA contents was about 34 g/kg DM and DNA was about

8 g/kg DM (DM 90-95%). BV

- 1964 Obizoba (IC). Growth, liver composition, and calcium balance of rats fed sorghum supplemented with two levels of beans. *Qualitas Plantarum - Plant Foods for Human Nutrition* 37(3); 1987; 193-200

A 35 day experimental study consisting of 28 day growth and 7 day calcium (Ca) balance periods was conducted to assess the effects of fibre and N ratios on growth and Ca balance of rats. Growth and Ca balance of rats (45-80 g) fed mixtures of cooked (CS) and uncooked (RS) sorghum and dehulled (DB) and undehulled (UB) bean were studied. The diets contained 10% protein. Casein served as the control protein. The control group ate more food except for the group fed the CS:DB (60:40) diets ($P < 0.05$) had higher values for all parameters tested than the test groups. There were increases in food and Ca intakes, fecal Ca, wt. gain, protein efficiency ratio (PER), liver wt. and composition except for the low moisture value for the CS:DB (60:40) group when N ratio were changed from 80:20 to 60:40. These results appear to indicate that fiber and N ratio had significant effects on growth, liver composition and Ca balance of the rats. AS

Nutrition

- 1965 Eggum (BO), Juliano (BO), Ibabao (MGB), Perez (CM) and Carangal (VR). Protein and energy utilization of boiled rice-legume diets and boiled cereals in growing rats. *Qualitas Plantarum - Plant Foods for Human Nutrition* 37(3); 1987; 237-245

In growing rats, boiled milled rice-legume diets (2:1 N ratio) had lower energy digestibility than boiled milled rice and equal if not better true digestibility, biological value and net protein utilization (NPU). Rice-soybean diets showed better NPU than the other rice-legume diets. Boiled whole-grain corn and sorghum had lower digestible energy and NPU than boiled milled rice. NPU of the diets did not follow strictly the trend of the amino acid score of the diets; phenol (tannin) content reduced energy and protein digestibility of all diets, but sugars reduced energy and protein digestibility of rice-legume diets only. AS

- 1966 Lathia (D), Hoch (G) and Kievernagel (Y). Influence of phytate on in vitro digestibility of casein under physiological conditions. *Qualitas Plantarum - Plant Foods for Human Nutrition* 37(3); 1987; 229-235

The phytic acid content of four different var. of beans under different processing conditions was estimated. It was highest in red kidney (1.86-2.13%) slightly lower in pigeon (1.86-2.03%), white (1.80-1.96%) and black eyed beans (1.15-1.64%). There was no significant change in phytic acid content of beans after soaking at 25 °C for 22 h. However, both soaking and cooking revealed 26-37% loss of phytic acid in all four var. of beans. The rate of in vitro casein digestibility with and without phytic acid at concn. found in legumes was determined at pH 8 and 37 °C using multienzyme technique. Addition of 5 mg Na-phytate reduced the casein digestibility up to 20% compared to the control. However, only 25% reduction of casein

digestibility was observed in the presence of 25 mg of Na-phytate. Higher concn. of Na-phytate had no significant effect on the rate of casein digestibility. Data strongly suggest the formation of protein phytate complex at alkaline pH of small intestine. AS

- 1967 Nestle (M). Promoting health and preventing disease. National nutrition objective for 1990 and 2000. *Food Technology* 42(2); 1988; 103-107

Status of 17 nutrition guidelines is evaluated and their implementation by the food industry is also discussed. BV

- 1968 Sandberg (AS), Andersson (H), Carlsson (N-G) and Sandstrom (B). Degradation products of bran phytate formed during digestion in the human small intestine. Effect of extrusion cooking on digestibility *Journal of Nutrition* 117(12); 1987; 2061-2065

To investigate the digestion of phytate in the stomach and small intestine in humans, studies were performed in subjects with established ileostomy. A recently developed HPLC method made it possible to analyze phytate and its degradation products in food and digesta. The digestibility of phytate in raw bran and extruded bran was investigated in seven ileostomy patients. Each subject was studied for two 4-d. periods while consuming a constant low fiber diet with the addition of either 54 g/d of a bran gluten starch mixture or the corresponding extruded product. During passage through the subject's stomach and small intestine 58% on average of the phytate in unprocessed bran was hydrolyzed to inositol penta-tetra and triphosphates. When bran was subjected to extrusion cooking 25% of the inositol hexaphosphate was hydrolyzed to penta- and tetraphosphate and the phytase activity ceased. Essentially no phytate digestion occurred when the ileostomy subjects consumed the extruded product. The reduced digestibility might be due to the lost phytase activity or to formation of indigestible phytate complexes during extrusion cooking. AS

TOXICOLOGY

Bacteria

Staphylococcus

Enterotoxins

- 1969 Notermans (S), Boot (R) and Tatini (SR). Selection of monoclonal antibodies for detection of staphylococcal enterotoxins in heat processed foods. *International Journal of Food Microbiology* 5(1); 1987; 49-55

The existence of monoclonal antibodies which neutralize the staphylococcal enterotoxin in vivo (monkey feeding test) is demonstrated in this study. The monoclonal antibodies also recovered native and heated staphylococcal enterotoxin assay (SEA) as efficiently as the polyclonal antibodies (from sheep) in the ELISA system. This study

also points out the need for selection of only SE neutralising monoclonal antibodies for use in ELISA of processed foods for evaluation of public health safety. BV

Nitrosamines

- 1970 Lijinsky (W), Kovatch (RM), Keefer (LK), Saavedra (JE), Hansen (TJ), Miller (AJ) and Fiddler (W). Carcinogenesis in rats by cyclic N-nitrosamines containing sulphur. Food and Chemical Toxicology 26(1); 1988; 3-7

The effects of chronic exposure to three sulphur containing heterocyclic N-nitrosamines were determined after repeated oral administration to female Fischer 344 rats. Nitrosothiazolidine did not significantly affect the survival of the rats or the incidence of tumours at a total dose of 3.5 mmol. Nitrosodithiazine, an analogue of nitrosothiazolidine which contains an extra sulphur atom-inserted between the carbons of its CH₂-CH₂ moiety, produced only three tumours (two of the nasal mucosa) in a group of 20 rats at a total dose of 1.75 mmol/rat. Nitrosothiazoldine, the all cis-2,4,6 trimethyl analogue of nitrosodithiazine, was a potent carcinogen that significantly shortened the life span and produced oesophageal tumours in 70% of treated rats as well as numerous tumours of the tongue and liver. This outcome was unexpected because Alpha-methyl substitution in other heterocyclic nitrosamines usually reduces or eliminates tumorigenicity. The results extend the data base on the carcinogenic activity of mole. containing both divalent sulphur and the nitrosamino function. The lack of significant carcinogenicity of nitrosothiazolidine in this study suggests that its presence in the human food supply presents a relatively minor risk. AS

FOOD LAWS AND REGULATIONS

Nil

GENERAL

- 1971 Nullis (C). The food intolerance databank. *British Food Journal* 89(941); 1987; 144-146

Covers incidence, treatment of food intolerance, establishment of databank, operation of databank, advantages and disadvantages. BV

- 1972 Rogoff (MH) and Rawlins (SL). Food security: A technological alternative. *BioScience* 37(11); 1987; 800-807

This paper discusses the role of biotechnology in converting biomass into a stable food supply. BV

FOOD PROCESSING

- 1973 Shattuck (E). Stabilization of military rations by thermal processing. *Activities Report* 39(1); 1987; 133-137

FOOD PACKAGING

- 1974 Brown (WE). Selecting barrier systems for food packages. *Activities Report* 39(1); 1987; 29-49

Systematic selection of barriers plastics for packaging is considered. Functional and legal considerations in choosing a plastic for food packaging is also considered it applies to civilian and military food packaging. BV

- 1975 Cramer (GM). FDA views on high barrier food packaging. *Activities Report* 39(1); 1987; 55-58

- 1976 Ellis (SE) and Gibson (ED). Influence of residual compounds in polystyrene food packages. *Activities Report* 39(1); 1987; 71-78

This paper describes the sensory chemical analysis test program to determine the off-odour and off-flavour of packaged food products, due to polystyrene resins (styrene monomer or ethyl benzene) processing steps such as extrusion, thermoforming affecting these resins and relative conc. of these resins required to produce flavour effects in food simulating test media. BV

- 1977 Till (D), Schwoppe (AD), Ehntholt (DJ), Sidman (KR), Whelan (RH), Schwartz (PS) and Reid (RC). Indirect food additive migration from polymeric food packaging materials. *CRC Critical Reviews in Toxicology* 18(3); 1987; 215-243

Packaging materials

Plastics

- 1978 Hotchkiss (JH). Comparative sorption of aromatic flavours by plastics used in food packaging. *Activities Report* 39(1); 1987; 65-70

Dry and aqueous aromatic foods in contact with LDPE or ionomers, sorption of the volatile flavour compounds can occur, which can be detected by the human senses. This indicates the possibility of an flavour adversely influenced by contact with polymeric packaging materials. The extent of sorption depend on several factors including the type of polymer, the conc. and chemical structure of the aroma compounds, the storage temp. and time, the mass of polymer and the presence of other components in the aqueous phase. BV

- 1979 Wachtel (JA). Packaging food in retortable plastic containers. *Activities Report* 39(1); 1987; 59-64

Polymer films

- 1980 DeLassus (PT) and Marcus (SA). Diffusion and sorption of organic molecules by polymer films. *Activities Report* 39(1); 1987; 91-97
- 1981 Giacin (JR) and Hernandez (RJ). Evaluation of the aroma barrier properties of polymer films by sorption and permeation methods. *Activities Report* 39(1); 1987; 79-90

Study involves the permeation measurements of d-limonene on a series of polymer films used in food packaging, the effect of limonene partial pressure on the permeation rate and permeability constant. The solubility and solubility coeff. of limonene vapour in two cereal packaging film samples has been carried out using a gravimetric technique at a series of penetrant conc. levels. BV

Polyvinylidene dichloride

- 1982 Marcus (SA). PVDC and its uses in food packages. *Activities Report* 39(1); 1987; 50-54

FOOD ENGINEERING AND EQUIPMENT

Engineering

- 1983 Barrett (A). Factors determining the infusion of suspended particulates into porous food matrices. *Activities Report* 39(1); 1987; 154-162

- 1984 Bennasar (M) and Tarodo De La Fuente (B). Model of the fouling mechanism and of the working of a mineral membrane in tangential filtration. *Sciences des Aliments* 7(4); 1987; 647-655
- 1985 Lachica (RV). Factors for estimating the safety of temperature-abused chilled and frozen foods. *Activities Report* 39(1); 1987; 138-144
- 1986 Leeson (R). The applications of liquid nitrogen in individual quick freezing and chilling. *Food Technology in New Zealand* 22(10); 1987; 14-15

The use of liquid N for individual quick freezing (IQF) processing and chilling is expanding with the increase in convenience food market sector. Discusses properties of liquid N as a refrigerant, product quality, methods of application, process applications (individual quick freezing, case hardening/crust freezing, chilling and cooking), flexibility and economics. The speed with which the liquid and evolved gas are able to initiate temp. reduction gives the system marked advantages over electro-mechanical systems, particularly with regard to evaporative wt. loss, product quality and system flexibility. BV

- 1987 Mahiout (S) and Vogelpohl (A). Fluid dynamics and mass transfer of Newtonian and non-Newtonian mixtures on sieve trays. *FAT Science and Technology* 89(10); 1987; 400-408

Highly viscous media are processed in a number of industries such as the chemical, pharmaceutical, petrochemical and food industries, whereby a great number of the used systems has a non-Newtonian behaviour. To improve the knowledge of mass transfer processes in Newtonian and non-Newtonian mixtures systematic experiments for fluid dynamics and mass transfer were carried out on various sieve trays. The realised results show that the separation performance of tray columns can be increased significantly by a suitable choice of operating conditions and sieve tray lay-out. This paper summarizes results on the absorption of oxygen into water and in non-Newtonian liquids like carboxyl-methylcellulose/water and polyacrylamide/water. In parallel to the experimental measurements new correlations for the mass transfer of tray columns operating with average and high viscous media were developed. AS

- 1988 Mohr (K-H) and Kirschstein (U). Instationary transport processes in food technology (IV). *Lebensmittelindustrie* 34(5); 1987; 202-206 (De)

For the calculation of heating and chilling processes in solid foodstuffs, one must have the thermophysical material data of thermal conductivity, specific thermal capacity and temp. conductivity as well as density and porosity in dependence of the process conditions. Measured values are available in literature only incompletely. In this article calculation equations are introduced that are constructed simply. They are suitable to get sufficiently exact values for calculation, design, modelling, optimization and microcomputer control of chilling and heating processes with simple means (pocket computer). In a voluminous table the thermophysical material data of individual

solid foodstuffs are compiled as comparative values. AS

ENERGY IN FOOD PROCESSING

- 1989 Decareau (RV). Microwave heating for military foodservice. *Activities Report* 39(1); 1987; 98-101

FOOD CHEMISTRY AND ANALYSIS

Chemistry

- 1990 Huang (AS) and Von Elbe (JH). Effect of pH on the degradation and regeneration of betanine. *Journal of Food Science* 52(6); 1987; 1689-1693

This study was undertaken to investigate the influence of pH on betanine based on the regeneration kinetics in pH range of 3.0-7.0. The results revealed that betalamic acid was most stable with increase in pH whereas cyclodopa-5-O-glucoside was more stable with decrease in pH confirming the reported conclusion that betanine is most stable at the pH range of (4.0-5.0) NGKR

- 1991 Puller (S) and Kroll (J). Model tests about interactions between amylose and emulsifiers. *Lebensmittelindustrie* 34(5); 1987; 196-198

The authors have examined interactions between amylose and selected emulsifiers by ascertainment of the amylose bond index at model systems. They explain test substances, methods and results and draw conclusions with regard to the influencing of the functional characteristics of foodstuffs rich of starch by emulsifiers. AS

- 1992 Schafer (W). Lecithin-more than an additive. *Getreide, Mehl und Brot* 42(1); 1988; 26-30 (De).

The review article summerises the present status on the knowledge and applications of lecithin in (a) technical fields (with enumeration of its roles in foods, and (b) dietetics and pharmacy. The later has been discussed with little elaboration including the role of lecithin in animal tissue and the status is classified under the heads: 1. Exchange of fat and phospholipids, 2. Membrane functions, 3. Blood-brain barrier and 4. Liver and bile. SZA

Chemistry (Analytical)

- 1993 Deor (K). Showing your true colours. *Food, Flavourings, Ingredients, Packaging and Processing* 10(2); 1988; 51-53

Tristimulus colorimetry, an economical means of colour measurement is described with principle. A colour can be measured by its three primary stimuli values X (red/blue mix), Y (green) and Z (blue)

and with the help of graphs. SYR

- 1994 Hamano (T), Mitsuhashi (Y), Yamamoto (S), Matsuki (Y), Tonagai (Y), Nakamura (K) and Ito (Y). Determination of ethylenediaminetetra-acetic acid in food by colorimetry. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi') 34(9); 1987; 603-607

A method is described for the detn. of ethylenediaminetetra-acetic acid (EDTA) and its metal chelates in foods. The principle of the method is that free copper ion (Cu^{2+}) reacts with bathocuproine but EDTA-Cu does not under definite condition. Food samples were homogenized with 0.1 M NaOH, then subjected to equilibrium dialysis against 0.02 M NaOH. EDTA and its metal chelates in the dialyzate were converted into EDTA-Cu at pH 2.5 by the addition of copper sulphate. The solution was then divided into two portions of equal volume. One portion was subjected to assay of free Cu^{2+} , and the other to assay of total (the sum of free and chelated) Cu^{2+} . EDTA was calculated from the difference between the absorbances (477 nm) obtained with free and total Cu^{2+} . Analyses of several foods with EDTA-Ca added showed the recovery of 88.7 - 99.4% for 50 $\mu\text{g/g}$ and 92.7 - 99.9% for 250 $\mu\text{g/g}$. Food ingredients such as organic acids, proteins, amino acids, peptides, phenolic compounds and emulsifying agents were without interferences. AS

- 1995 Krogh (G). Analysis of water soluble synthetic colours. *Var Foda* 39(9-10); 1987; 420-432

FOOD MICROBIOLOGY AND HYGIENE

Enzymes

Amylases

- 1996 Suzuki (Y), Nagayama (T), Nakano (H) and Oishi (K). Purification and characterization of a maltotriogenic alpha amylase I and a maltogenic alpha-amylase II capable of cleaving alpha-1,6-bonds in amylopectin. *Starch/Starke* 39(7); 1987; 246-252

Glucoamylases

- 1997 Slininger (PJ), Fanta (GF) and Abbott (TP). Glucoamylase immobilized on acid-hydrolyzed starch graft polyacrylonitrile. *Biotechnology and Bioengineering* 31(8); 1988; 759-769

A continuous stirred reactor fed maltose as substrate was used to show that acid hydrolyzed starch-polyacrylonitrile and other polysaccharide graft copolymers can bind and retain significant quantities of active glucoamylase. Glucose productivities up to 2.7 g/g carrier/h were observed with the immobilized glucoamylase, and half-lives up to 1800 h were indicative of activity longevity. Factors influencing the immobilized enzyme activity and first-order decay rate

included temp., pH, and carrier composition. In all cases, maltose was converted quantitatively to glucose with no evidence of reversion product formation. AS

Fermentation

- 1998 Bezenger (M-C) and Navarro (S-M). Alcohol fermentation. Model accumulating for initial nitrogen influence. *Biotechnology and Bioengineering* 31(7); 1988; 747-749

A model proposed here provides a good description of the evolution of the specific rate of carbon dioxide production as a function of the reaction process. This model provides a display of the influence of nitrogen on the specific rate of production. GAR

Microorganisms

- 1999 McCormick (NG). Control of microorganisms in military rations. *Activities Report* 39(1); 1987; 127-132

Algae

Dunaliella bardawil

- 2000 Mokady (S) and Cogan (U). Nutritional evaluation of a protein concentrate and of carotenes derived from *Dunaliella bardawil*. *Journal of the Science of Food and Agriculture* 42(3); 1988; 249-254

In this study of quality of the protein of green alga *Dunaliella bardawil* was evaluated with rats and the P.E.R. was found to be 1.2 and the protein was found to be limited by lysine to the extent of 70% out of which 60% only was available. The carotenes of the alga were found to be absorbed and recovered as retinol in the rat livers in proportion to that of commercial beta-carotene. NGKR

Bacteria

Bacillus subtilis

- 2001 Sesma (MBF), De Ruiz Holgado (AP) and Mendoza (D). Transfer of plasmids between *Bacillus subtilis* and *Streptococcus lactis*. *Applied and Environmental Microbiology* 54(5); 1988; 1309-1311

The lactic streptococci are widely used for dairy and other food fermentations. The work carried out relates to the use of protoplast fusion for the intergenic transfer of plasmids between *Streptococcus lactis* and *Bacillus subtilis* with the objective of developing molecular genetic techniques and tools for the industrially important *S. lactis*. RJ

Lactobacillus bulgaricus

- 2002 Chow (JJ), Batt (CA) and Sinskey (AJ). Characterization of *Lactobacillus bulgaricus* bacteriophage-Ch 2. *Applied and Environmental*

Microbiology 54(5); 1988; 1138-1142

Listeria

- 20Q3 Van Netten (P), Vandeven (A), Perales (I) and Mossel (DAA). A selective diagnostic medium for use in the enumeration of *Listeria* spp. in foods. *International Journal of Food Microbiology* 6(3); 1988; 187-198

A new medium, called RAPAMY agar, has been elaborated for the isolation from and the enumeration of *Listeria* spp. in foods. It is based on Ralovich's nalidixic acid-trypaflavin-agar with the following modifications: (i) the slight inhibitory properties of that medium were overcome by the use of Columbia Blood agar base instead of tryptose agar and the addition of 0.05% ferric ammonium citrate and 2.5% egg yolk emulsion; (ii) selectivity was improved by the addition of 0.25% 2-phenyl ethanol and incubation under microaerobic conditions; (iii) the medium was provided with two diagnostic traits by the addition of (a) aesculin + ferric ammonium citrate; and (b) D-mannitol and phenol red. The growth of *Enterococcus* spp., the only organisms other than *Listeria* spp. which grow on RAPAMY agar, was not inhibited by the addition of 20 μ ml . Cefoxitin (Moxolactam). Higher levels inhibited some *Listeria* spp. but not the enterococci. The medium recovered *Listeria* spp., quantitatively, and allowed recovery from foods colonized by *Enterococcus* spp., at levels upto 10^2 g. In the examination of about 300 samples of various processed foods, *Listeria* colonies were surrounded by a dense halo against a deep red background, whereas the *Enterococcus* strains produced colonies with green-blue halos. NK

*Fungi**Aspergillus parasiticus*

- 2004 Buchanan (RL) and Stahl (HG). Characterization of a caffeine-resistant mutant of *Aspergillus parasiticus*: Role of amino acid metabolism. *Journal of Food Science* 52(6); 1987; 1718-1720, 1725

In this investigation studies on relationship between caffeine dependent aflatoxin synthesis and amino acid metabolism have been summarised. These studies showed that caffeine dependent aflatoxin production in *Aspergillus parasiticus* BCRI a caffeine resistant mutant of *A. parasiticus* NRRL 2999 was dependent on amino acid catabolism. NGKR

Geotrichum candidum

- 2005 Latrasse (A), Dameron (P), Hassani (M) and Staron (T). Production of a fruity aroma by *Geotrichum candidum* (Staron). *Sciences des Aliments* 7(4); 1987; 637-645

A fruity aroma, reminiscent of quince, has been produced by cultivation of a mutant, *Geotrichum candidum* (Staron), in two agitated liquid media containing glycerol and an amide (urea or L- asparagin). The volatile fractions of the cultures have been analysed by GC and

GC-MS. 16 compounds have been identified: 7 ethyl esters: Propanoate, butanoate, 3-methyl-propanoate, 2-methyl and 3-methylbutanoate, 3-methylbut-2-enoate and hexanoate; 5 methylpropyl esters: acetate, propanoate, butanoate, methyl propanoate and 2-methylbutanoate; 4 alcohols: methylpropanol, 2-methyl and 3-methylbutanol and 2-phenylethanol. The dominant quince-like smell of the cultures is due to ethyl methylpropanoate. The originality of the mutant has been demonstrated by comparison with four other strains belonging to the same species, isolated from diverse cheeses. Within the limits of the present investigations, production of esters by the mutant has been only observed by its cultivation in the two already quoted media. AS

Mushrooms

- 2006 Roy (SK) and Samajpati (N). Free amino acid composition in the cell pool of three Indian edible mushrooms. *Science and Culture* 54(4); 1988; 135-136

Free amino acids in the cell pool of the submerged mycelia of *Lentinus cladopus*, *Len. squarrosulus*, *Collybia maculata* growing in basal and optimum media have been determined. Amino acids in the cell pool, growing in basal and optimal media do not show remarkable variation. *Len. cladopus* contained higher amount of isoleucine (3.93-4.31 g/100 g dry wt.) while *Len. squarrosulus* and *Coll. maculata* were rich in leucine and phenylalanine contents resp. All test fungi show no cystine but a little amount of proline. Methionine is present in considerable amount (1.07-1.22 g/100 g dry wt.) in both the sp. of *Lentinus*. KAR

Yeasts

- 2007 Huang (YT) and Kinsella (JE). Effects of phosphorylation on emulsifying and foaming properties and digestibility of yeast protein. *Journal of Food Science* 52(6); 1987; 1684-1688

Phosphorylated yeast protein (PYP) (73% protein, < 3% nucleic acid) was prepared from yeast nucleoprotein by chemical phosphorylation using phosphorus oxychloride. The emulsifying activity index (EAI) of PYP was low at pH 5 but exceeded that of BSA at pH 7.0. The emulsions were stable after heating to 90 °C for 60 min. The stability of foams made with PYP increased from t_{1/2} 1.5 to 13 min as pH was increased from 5 to 8. Foams made from PYP were easily digested by pepsin and pancreatin indicating negligible inhibition by phosphorylation. AS

Hygiene

- 2008 McBean (LD). A perspective on food safety concerns. *Dairy and Food Sanitation* 8(3); 1988; 112-118

A general article on food safety covering aspects like microbiological contamination of foods, specific bacterial pathogens, their control and prevention. Other food safety concerns includes intentional and unintentional food additives. 69 references. CTD

Vinegars

- 2009 Koizumi (Y), Uehara (Y) and Yanagida (F). The general composition, inorganic cations, free amino acids and organic acids of special vinegars. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi)' 34(9); 1987; 592-597 (Ja).

The general composition, inorganic cations, free amino acids and organic acids were examined on 11 kinds of special vinegars in Japan, which were commercially available at relatively high prices. The data obtained were compared to those of ordinary rice vinegars. The results were as follows: (1) Not much difference in general composition was detected among these vinegars, though sediments were found in most samples of black vinegars which emphasized addition of caramel during its preparation. (2) The major inorganic cations present in special vinegars were found to be Na followed by K and Mg. (3) The total free amino acid contents of special vinegars ranged from 56.9 to 362.6 mg/100 ml were rich in alanine, leucine, lysine, valine and glycine. The special vinegars were high in amino acid compounds as compared to the ordinary rice vinegars. The difference in their amount seemed to be caused by the difference in the raw materials and method of preparation. The ratio of essential amino acids to the total free amino acids ranged from 45 to 50%. (4) Lactic acid was the most abundant followed by pyroglutamic acid among organic acids except acetic acid in special vinegars. The results of this study showed that special vinegars which are sold at relatively high prices were doubtful in terms of quality and prices. AS

BIOTECHNOLOGY

- 2010 Friedt (W). Biotechnology in breeding of industrial oil crops-The present status and future prospects. *FAT Science and Technology* 90(2); 1988; 51-55

Use of tissue and cell culture techniques and genetic engineering in breeding of rapessed, linseed, sunflower and soybean has been discussed. N

TISSUE CULTURE

Nil

FOOD ADDITIVES

- 2011 Anon. Intolerance reactions to food additives. *British Food Journal* 89(941); 1987; 150-151

This articles covers, allergic reactions to food additives, extent of intolerance reactions, MAFF studies of intolerance reactions

to food additives, Wycombe study, intolerance in children and tartrate effect on normal adults. BV

Emulsifiers

Sodium caseinate

- 2012 Robson (EW) and Dalgleish (DG). Interfacial composition of sodium caseinate emulsions. *Journal of Food Science* 52(6); 1987; 1694-1698

CEREALS

- 2013 Raffi (J), Agnel (J.-P) and Kassis (S-R). Electron spin resonance identification of irradiated cereals. *Sciences des Aliments* 7(4); 1987; 657-663

Electron Spin Resonance (ESR) spectra of bread-wheat, barley and maize are studied with regard to irradiation dose and storage time; computer simulations and measurements of ESR and kinetic constants gave the proof that these spectra are mainly due to the radicals induced in starch. The use of ESR in identifying irradiated cereals is discussed. AS

- 2014 Ratschow (J-P). Technical requirements for the production of quality grain by air drying. *Getreide, Mehl und Brot* 42(1); 1988; 3-4

Factors governing the retention of the quality of cereal grain during the phases of storage before drying, drying, and storage after drying till processing are outlined. The importance of cooling after drying and storage of grain in cooled condition has been emphasized. In normal agricultural trade practices this fact is generally overlooked. It is recommended that the storage silos should have facilities for aeration and other arrangements for the proper control of temp. and relative humidity. SZA

Breakfast cereals

- 2015 McAuley (JA), Kunkel (ME) and Action (Jc). Relationships of available lysine to lignin, colour and protein digestibility of selected wheat-based breakfast cereals. *Journal of Food Science* 52(6); 1987; 1580-1582, 1610

The relationships among available lysine and lignin, colour and in vitro protein digestibility for wheat based breakfast cereals processed by different methods of heat input. The cereals processed by extrusion had lower loss of available lysine than cereals processed by extrusion puffing or flaking and toasting. It was also seen that Hunter L values were positively correlated with all measures of lysine availability and protein digestibility except pepsin-pancreatin digest residue (PPDR) and inversely correlated with lignin of the cereals. NGKR

Buckwheat

- 2016 Mazza (G). Lipid content and fatty acid composition of Buckwheat seed. *Cereal Chemistry* 65(2); 1988; 122-126

Dehulled seed of the three most important North American cvs of buckwheat, Mancan, Tokyo, and Manor, were analyzed for content of total, free, neutral, glyco- and phospholipids, and each class of lipid was analyzed for fatty acid composition. The samples contained from 2.6 plus or minus 0.2 to 3.2 plus or minus 0.1% total lipids of which 81-85% were neutral lipids, 8-11% phospholipids, and 3-5% glycolipids. Free lipids, extracted in petroleum ether, ranged from 2.1 plus or minus 0.1%. The major fatty acids of all cvs and of all classes of lipids were palmitic (16:0), oleic (18:1), and linoleic (18:2) acid. Average values of these three fatty acids in the total lipids of all buckwheat samples examined were 14.0 plus or minus 0.8, 36.3 plus or minus 1.9 and 37.0 plus or minus 1.9% resp. The corresponding values for the free lipids were 14.8 plus or minus 1.5, 36.5 plus or minus 2.9, 35.5 plus or minus 1.9% and those for phospholipids were 9.1 plus or minus 0.8, 44.3 plus or minus 4.4, and 41.7 plus or minus 2.8%, resp. Total lipid content showed significant positive correlation with free, neutral, and glycolipid contents, and there was a highly significant negative correlation between oleic and linoleic acid contents of all lipid classes. There was, however, no statistical difference between new and old buckwheat in the content of free, neutral, glyco-, and phospholipids and in the fatty acid composition of total and free lipids. AS

Oats

Oat proteins

- 2017 Ching-Yung Ma) and Khanzada (G). Functional properties of deamidated oat protein isolates. *Journal of Food Science* 52(6); 1987; 1583-1587

In this study oat protein isolates were deamidated to varying degrees and changes in physicochemical and functional properties were determined. The deamidated oat-protein was prepared and subjected to chemical analysis, pH-titration, Gel filtration chromatography, functional properties studied by standard methods. The results showed no significant cleavage of peptide linkages although the aggregated and oligomeric oat proteins were extensively dissociated. By deamidation marked improvement in solubility, emulsifying properties and water and fat binding capacities was achieved. By mixing egg white with deamidated oat isolates a firm elastic gel was produced by lowering the pH for heat induced gelation. NGKR

- 2018 Hansen (AE), Nassuth (A) and Altosaar (I). Rapid electrophoresis of oat (*Avena sativa* L.) prolamins from single seeds for cultivar identification. *Cereal Chemistry* 65(2); 1988; 153-154

A quick method for the extraction of alcohol-soluble proteins (prolamins) of oats from single seeds and flour samples was developed. Sodium dodecyl sulphate polyacrylamide gel electrophoresis was carried

out using a programmable, microprocessor-controlled electrophoresis unit and ultrathin prefabricated polyacrylamide gels. This system allowed gels to be run, stained, and destained in 1 h. The prolamin patterns from seven different oat cvs were sufficiently unique for cv. identification. With this equipment, most variables that hindered reproducibility in the past were removed. With minimal experience it was possible to obtain standardized, repeatable electrophoregram prolamin patterns quickly. AS

Wheat

- 2019 Evers (AD) and Reed (M). Some novel observations by scanning electron microscopy on the seed coat and nucellus of the mature wheat grain. *Cereal Chemistry* 65(2); 1988; 81-85

The seed coat and nucellar epidermis of wheat caryopses were investigated by scanning electron microscopy. The generalized concept of these tissues previously available from light microscopical studies has proved inadequate to describes the considerable variation present in cell morphology and orientation. An amorphous layer, previously unreported in mature grains, was shown to exist between the nucellar epidermis and aleurone layer. The layer is absent over the embryo and thinner on the dorsal side of the grain than on the flanks of the crease. The relationship between its variation in thickness and the rate of the water penetration into the grain is noted. AS

- 2020 Pomeranz (Y), Martin (CR), Rousser (R), Brabec (D) and Lai (FS). Wheat hardness determined by a single kernel compression instrument with semiautomated feeder. *Cereal Chemistry* 65(2); 1988; 86-94

Hardness values were determined, using compression instrument equipped with semi-automated kernel feeder, on 33 samples from six classes of wheat, 16 samples from graintrade and 22 blends of hard and soft red white wheats. Software was developed to compute, analyse and print data pertaining to kernel size, moisture content in relation to hardness and damaged starch in flours. Also the data obtained was compared with results of A from other hardness tests on bulk wheat samples. The data gave highly significant correlation for hardned winter wheats (HRW) in blends. AR

- 2021 Schatzki (TF) and Fine (TAB). Analysis of radiograms of wheat kernels for quality control. *Cereal Chemistry* 65(3); 1988; 233-239

Daily film radiograms were obtained of hard winter wheat kernels following one day exposure to each of the four major hidden insect pests of North American wheat (*Sitophilus zeamais*, *Sitophilus oryzae*, *Ryzopertha dominica*, and *Sitotroga cerealella*). Resulting films were viewed in transmitted light using microscopic lenses and image enhancement. When presented with the image of a single kernel for 1 sec, a trained operator could detect the presence of a hidden insect of these four species, resp., with 80% accuracy 8, 7, 27, and 15 days after oviposition. False negatives generally decreased exponentially with insect maturity. False positives amounted to 0.08%. The implications for wheat quality control are discussed. AS

- 2022 Singh (T) and Bains (GS). Storage of wheat malt: Sorption properties and water activity interrelations with malt and wort characteristics. *Cereal Chemistry* 65(2); 1988; 118-122

The interrelation of water activity and wheat malt and wort characteristics during storage was investigated. The sorption isotherm of wheat malt was sigmoid. For storage, equilibrated malts corresponding to water activity of 0.112, 0.328, 0.52 and 0.756 were kept at 30 °C and analyzed for changes in malt and wort characteristics at bimonthly intervals for eight months and at the end of 12 months. On storage, malts corresponding to water activity of 0.112, and 0.328 showed some variation in diastatic power and alpha-amylase activity. Malts kept at 0.52 water activity showed minimal changes in diastatic power and alpha-amylase activity and at the same time gave higher extracts. Except for the yield of extract, which was satisfactory, deterioration in malt characteristics occurred when malts were stored at 0.756 water activity. Analysis of data by response-surface methodology, applying second- and third-order polynomials, and by a linear correlation coefficient matrix showed that decreasing pH of worts caused by increasing water activity of the malts affected wort characteristics considerably more than the duration of storage. AS

- 2023 Williams (PC), El-Haramein (FJ), Orti-Ferreira (G) and Srivastava (JP). Preliminary observations on the determination of wheat strength by near-infrared reflectance. *Cereal Chemistry* 65(2); 1988; 109-114

Near Infrared Reflectance meter was used to measure the variation in strengthening in Canadian wheats by calibrations developed on the basis of protein content, hardness, farinograph characteristics, Pelshenke test, SDS-Sedimentation test and Alveograph values. Both protein and oil bands were prominent in the development of calibrations for most of the strength parameters. AR

- 2024 Zwingelberg (H), Bolling (H) and Gerstenkorn (P). Possibilities of an extended use of NIR with the intake of wheat. *Getreide, Mehl und Brot* 42(1); 1988; 4-9 (De).

NIR spectroscopy is used presently for estimation of moisture and protein contents and grain hardness. Other quality parameters like sediment volume and baked volume give only a gross estimate of quality. Estimation of water uptake and dough characteristics are to be made in order to get a wider range of measuring data for testing the quality of wheat. In a fast method developed, wheat sample is ground in a Falling-number grinder to a grit size suitable for NIR measurements, and its protein content and grain hardness determined. From these data water uptake requirement is calculated. Fifty of grits and the calculated quantity of water are kneaded in a Braun mixer for 20 sec. This dough is allowed to rest for 2 min and evaluated by sensory method. It is possible to differentiate the wheat quality, with the above method keeping in view protein content and other parameters. SZA

Wheat flour

- 2025 Shogren (MD), Hashimoto (S) and Pomeranz (Y). Cereal pentosans: Their estimation and significance. IV. Pentosans in wheat flour varieties and fractions. *Cereal Chemistry* 65(3); 1988; 182-185

Total and water-soluble pentosans were determined in flours milled from hard red winter, hard red spring, and soft red winter wheat cvs grown at various locations and environments; in two sets of commercial air-fractionated flours; and in gluten, starch, and water solubles separated from flours that varied in pentosan contents. There was a negative correlation between protein and soluble pentosan contents. Water absorption and soluble pentosans were correlated, and the correlation coeff. increased if the results were expressed on a constant protein basis. In air-fractionated flours, protein and pentosan contents were correlated positively. Pentosan contents of three flours were related to yields of gluten and prime starch. AS

Wheat proteins

- 2026 Clements (RL). A labour saving technique for polyacrylamide gel electrophoresis of gliadins from large numbers of single wheat kernels. *Cereal Chemistry* 65(2); 1988; 150-152

Gel capacity was increased by use of a 40-place well-former, and labor was reduced by steeping crushed kernels in ethylene glycol and applying extracts to gels without centrifugation. About 30 min of labor was required to process 80 kernels for simultaneous polyacrylamide gel electrophoresis on two gels. Large numbers of single kernels were extracted with minimal effort. Permitting rapid screening for establishing homogeneity in grain samples and for application to inheritance studies. AS

- 2027 Dhaliwal (AS), Mares (DJ), Marshall (DR) and Skerritt (JH). Protein composition and pentosan content in relation to dough thickness of IB/IR translocation wheats. *Cereal Chemistry* 65(2); 1988; 143-149

Wheat cvs containing IB/IR translocation are known to give sticky dough presumed to be due to changes in protein composition and other flour constituents. The studies on extracted proteins using acidic buffer- and SDS-PAGE it was shown that the wheat cultivars and their derivatives had a similar protein distribution pattern except for an increase in the proportion of water soluble protein in IB/IR lines. Electrophoretic and immunological properties attribute this difference to the presence of rye secalin proteins which are more water soluble than their wheat counterparts. Though the water soluble pentosans were slightly higher in some IB/IR lines, but did not exceed the range normally found in bread wheats. AR

- 2028 Ewart (JAD). Studies on disulphide bonds in glutenin. *Cereal Chemistry* 65(2); 1988; 95-100

In order to obtain the average number of inter-chain disulphide bonds (SS) per glutenin chain, the reduced glutenin was either slowly reoxidised to encourage intra chain SS, the SH groups still unoxidised would then be a measure of interchain SS or the glutenin was partly

reduced to varying extent, and SH groups then blocked. The fraction (r) of SS broken was measured and plotted against the intrinsic viscosity (η)_u. Also a theoretical curve assuring a range of values for the fraction of the junctions with two SS in linear glutenin (S) was drawn to calculate r and (η)_u and compared with the experimental points by computer to get the best fit for S . The value for S was unlikely to be greater than 0.3 and could be zero, suggesting thereby that nearly all the junctions of linear glutenin molecule are likely to consist of a single SS. The value for r in the Mark-Harewink equation for glutenin appeared to be 0.5. A possible method is suggested for finding interchain SS when all subunit sequences are known. AR

- 2029 Kruger (JE), Marchylo (BA) and Hatcher (D). Preliminary assessment of a sequential extraction scheme for evaluating quality of RP-HPLC and electrophoretic analysis of gliadins and glutenins. *Cereal Chemistry* 65(3); 1988; 208-214

After preextraction with 0.5 M sodium chloride to remove albumins and globulins, the storage proteins of five wheats that vary widely in quality were extracted sequentially at 60 °C with 50% 1-propanol. 50% 1-propanol containing 4% dithiothreitol (DTT), and 50% 1-propanol containing 4% DTT and 1% acetic acid. Proteins present in the various propanol extracts were analyzed by sodium dodecyl sulphate gradient polyacrylamide gel electrophoresis and reversed-phase high-performance liquid chromatography (RP-HPLC). The 50% 1-propanol extracted the bulk of the gliadins, whereas the other solvents extracted mainly glutenin polypeptides. The separation of related storage protein groupings was not clear-cut, however, as some overlap occurred between fractions. By choosing appropriate RP-HPLC conditions, it was possible to quantitate the relative amounts of ω -gliadins; α -, β - and γ -gliadins; and high and low mole. wt. glutenins in the different solvents. The amount of high mol. wt. glutenins in 50% 1-propanol relative to the amount present in 50% 1-propanol containing DTT generally decreased with increasing dough strength. In addition, the ratio of high to low mol. wt. glutenin subunits in 50% 1-propanol containing 4% DTT increased with increasingly stronger wheats. AS

- 2030 Kurowska (E) and Bushuk (W). Solubility of flour and gluten protein in a solvent of acetic acid, urea, and cetyl-trimethylammonium bromide, and its relationship to dough strength. *Cereal Chemistry* 65(2); 1988; 156-158

This note presents a simple and accurate procedure for determining protein content of AUC (0.1M acetic acid, 3M urea, and 0.01M cetyl-trimethylammonium bromide) extracts and residues of flour and gluten. AUC-soluble protein was determined directly by a modified Biuret assay. AUC-insoluble protein was first dissolved in sodium laurate solution and then analyzed by the Biuret assay. For good accuracy, it was necessary to use separate calibration curves for AUC-soluble flour protein, AUC-soluble gluten protein, and AUC-insoluble flour or gluten protein. Flours (and their glutes) that yield strong doughs contain a higher proportion of AUC-insoluble protein. AS

- 2031 Lookhart (GL) and Albers (LD). Correlations between reversed-phase high performance liquid chromatography and acid and sodium dodecyl sulphate-polyacrylamide gel electrophoretic data on prolamins from wheat sister lines differing widely in baking quality. Cereal Chemistry 65(3); 1988; 222-227

Gliadins extracted from closely related (sister) wheat lines that vary widely in breadmaking quality were separated by reversed-phase high performance liquid chromatography (RP-HPLC). Each RP-HPLC peak was collected and analyzed by lactic acid-polyacrylamide gel electrophoresis (A-PAGE) and sodium dodecyl sulphate (SDS-PAGE). RP-HPLC separates proteins on the basis of hydrophobicity, a surface-related phenomenon. A-PAGE separates on the basis of size and charge. The combination of all this information on one sample allows correlation of data among methods. However, of greater importance are the differences found between the good baking quality sister line and the poor baking quality line. Three differences were found in the gliadins by both HPLC and A-PAGE. One of those differences was an ω -gliadin found only in the good quality line, whereas the other two differences were Beta gliadins found only in the poor quality line. Mole. wt., hydrophobicity, elution order, and gliadin type for each peak are reported. AS

- 2032 Marchylo (BA) and Kruger (JE). The effect of injection volume on the quantitative analysis of wheat storage proteins by reversed-phase high-performance liquid chromatography. Cereal Chemistry 65(3); 1988; 192-198

The relationship between injection volume and the binding of gliadins and glutenins to reversed-phase high-performance liquid chromatography (RP-HPLC) columns was studied. Significant quantitative changes were observed. Concomitant with increasing injection volume (5-80 μ l), in the amount of protein and in relative proportions of protein peaks eluted in chromatograms. Rapid decreases in the recovery of proteins, in particular the least hydrophobic gliadins, were observed as injection volume increased. Analysis of solvent peaks by RP-HPLC and sodium dodecyl sulphate gradient polyacrylamide gel electrophoresis indicated that as injection volume increased, progressively more gliadin and glutenin proteins did not bind to the column upon injection and were eluted in the solvent peak (i.e., void volume). The effects of column temp, extraction solvent, and type of column on this phenomenon were examined. A remedy to the problem was devised entailing the use of multiple 5- μ l injections of protein extract prior to initiation of the gradient program. Virtually 100% of proteins were bound to the RP-HPLC column using this technique. AS

MILLETS

Corn

- 2033 Jackson (DS), Rooney (LW), Kunze (OR) and Waniska (RD). Alkaline processing properties of stress-cracked and broken corn (Zea mays L.)

Cereal Chemistry 65(2); 1988; 133-137

Samples of three food-grade corn hybrids (Dekalb Pfizer T1100, Pioneer 3780, and Asgrow 405 W) with different levels of stress-cracked kernels were alkaline cooked using mild and harsh laboratory procedures. Stress-cracked grains, in general, did not significantly increase the levels of dry matter and chemical oxygen demand of the cook-steep water. However, stress-cracked grains can easily break when handled, and broken kernels greatly increased dry matter loss and chemical oxygen demand. The pericarp of the Asgrow 405 W hybrid was easily and completely removed during processing, whereas those of Dekalb Pfizer T1100 and Pioneer 3780 were only partially removed. Samples cooked using the harsh procedure had greater dry matter losses and chemical oxygen demand than those cooked under the mild procedure. Methods of determining stress-cracked and broken kernels were compared. Per cent breakage, as determined with the Wisconsin breakage tester, was significantly correlated with visual identification of multiple and total numbers of stress-cracked kernels. The Wisconsin breakage tester can be used to screen corn for potential breakage. The level of broken kernels and the ease of pericarp removal were the major factors influencing chemical oxygen demand and dry matter loss. Any protocol for assessing corn quality for alkaline cooking should include measures of broken kernels, potential for breakage, and ease of pericarp removal. AS

- 2034 Mounts (TL). Effect of laboratory-scale oil applications on quality factors of corn, soybeans, and wheat. Cereal Chemistry 65(3); 1988; 175-181

Soybeans, hard red winter wheat, soft red winter wheat, and corn treated with 200-800 p.p.m. of soybean oil, two mixtures of soybean oil and lecithin or mineral oil for avoiding dust during handling operations, were evaluated for grade, odour detection. Threshold, germination, flammability and handling properties during storage at ambient temp. upto one year. Single treatment upto 800 p.p.m of soybean oil or soy bean oil and lecithin mixtures had no significant effect on odour and grade of any of the grains studied. Multiple treatment with soybean oil at 1200 p.p.m. level adversely affected the odour of soybeans during storage for six months and above where as it did not affect the hard red white wheat upto 4800 p.p.m during storage for six months and to a little extent for corn treated upto 6400 p.p.m for storage upto one year. But the milling properties of corn were not affected. Objectionable odours were reported for mineral oil heated and stored grains during six months to one year. A treatment upto 2400 p.p.m. soybean oil did not increase the flammability in soybeans and had no significant repellency against weevil. No changes in germination and stress crack percentage of corn were observed for oil treatment.

- 2035 Osman (RO), Ahmed (FA), Khalil (FA) and Ali (MS). Effect of some herbicides as plant growth regulators on the chemical composition of Zea maize grains. Food Chemistry 28(3); 1988; 167-176

- 2036 Pflugfelder (RL), Rooney (LW) and Waniska (RD). Dry matter losses in commercial corn masa production. *Cereal Chemistry* 65(2); 1988; 127-132

Production of corn masa was studied in two commercial plants that manufacture tortilla chips, corn chips, and table tortillas. The magnitude and composition of corn dry matter (CDM) lost in the wastewater from each process were determined. Total losses of CDM were 8.5-12.5% for the four processes using overnight (normal) steeping. Abbreviated steeping (5 hr) at a higher temp. reduced CDM loss to 4.4%. About 50% of the wastewater solids were suspended solids that could be easily removed. The average composition of the suspended solids was 64% nonstarch polysaccharides (primarily pericarp fiber), 20% starch, and 1.4% protein. Total starch, protein, and lipid losses during processing were less than 5, 2, and 20%, resp. Losses of starch, protein, and lipid appeared to be greater when damaged corn and softer corn hybrids were processed. Other important factors were long steeping times, shear stresses during processing, and high cooking temp. AS

- 2037 Wu (YV). Reverse osmosis and ultrafiltration of corn light steep-water solubles. *Cereal Chemistry* 65(2); 1988; 105-109

Evaporative conc. of light steep water from about 10 to 50% solids in corn wet milling uses a great deal of energy. Another more efficient process was investigated. Light steep water was separated by continuous centrifuge (45, 200 x g) into light steep-water solubles (93% of total dry matter and 93% of total nitrogen) and centrifuged solids. Reverse osmosis (RO) at 1,360 k Pa (200 psi) combined with ultrafiltration (UF) of light steep-water solubles yielded on RO permeate of 70% of the total volume, 8.8% of total nitrogen, 10% of total solids, and 13% of total ash of light steep-water solubles. At 5,440 k Pa, RO combined with UF produced a permeate that had 80% of total volume, with residuals of 0.11% of the total nitrogen, 0.23% of the total solids, and 0.24% of the total ash initially present in the light steep-water solubles. At 6,800 k Pa, RO combined with UF resulted in a permeate of 84% of the total volume, 0.09% of total nitrogen, 0.18% of total solids, and 0.18% of total ash of light steep-water solubles. Thus, RO at 5,440 or 6,800 k Pa, combined with UF, appears practical to process a large volume of corn light steep-water solubles into a small volume of potentially useful conc. and a large volume of permeate suitable for reuse or safe disposal. AS

Corn proteins

- 2038 Lin (CS) and Zayas (J). Protein solubility, emulsifying stability and capacity of two defatted corn germ proteins. *Journal of Food Science* 52(6); 1987; 1615-1619
- 2039 Messinge (JK), Rupnow (JK), Zeece (MG) and Anderson (RL). Effect of partial proteolysis and succinylation on functionality of corn germ protein isolate. *Journal of Food Science* 52(6); 1987; 1620-1624

In this study the effect on functional properties viz. foaming capacity and stability, water and oil absorption, emulsifying capacity

and nitrogen solubility by modification of isolated corn germ protein with three levels of succinic anhydride and partial proteolysis with trypsin and pepsin have been determined. This has been done by partially hydrolysing corn germ protein isolate (CGPI) with trypsin and pepsin and succinylating at three levels. The results showed that the water absorption and foaming properties were improved by partial hydrolysis with trypsin, emulsifying capacity and nitrogen solubility reduced and oil absorption slightly increased whereas pepsin hydrolysis has decreased oil absorption, nitrogen solubility and emulsifying capacity but improving foaming properties without changing water absorption. It was also that succinylation retarded electrophoretic mobility while hydrolysis changed the band intensities. NGKR

Corn starch

- 2040 Chinnaswamy (R) and Hanna (MA). Relationship between amylose content and extrusion-expansion properties of corn starches. *Cereal Chemistry* 65(2); 1988; 138-143

Corn starches with 0-70% amylose contents (db) were extrusion cooked at different temp. and moisture contents. The product quality measures of expansion ratio, shear strength, and bulk density were studied in relation to starch amylose contents. The expansion ratio of starch increased from 8 to 16.4 as amylose content increased from 0 to 50% (db), and then decreased. Low- and high-amylose starches mixed to obtain various amylose levels and pure amylose/amylopectin mixes showed expansion property patterns similar to native corn starches but with lower expansion ratios (9.9-11.4). Different native corn starches had different optimum temp. for expansion i.e., 130 °C for 0% amylose, 140 °C for 25% amylose, 150 °C for 50% amylose, and 160 °C for 70% amylose starch. Overall, the highest expansion (16.4) was obtained with 50% amylose starch at 150 °C. All starches had a uniform moisture content optimum of 13-14% (db) for max. expansion. The bulk density of the extrudates decreased with increased amylose contents of starches. In contrast, shear strength of starch extrudates increased with amylose content of starch but decreased with expansion ratio. AS

- 2041 Chinnaswamy (R) and Hanna (MA). Nozzle dimension effects on the expansion of extrusion cooked corn starch. *Journal of Food Science* 52(6); 1987; 1746-1747

The effects of nozzle length and/or diameter on the expansion volume of cooked corn starch during extrusion have been studied by extrusion of normal corn starch through nozzles with different length to diameter ratios (L/D). The results showed that the expansion ratio of the extrusion cooked starch increased from 4.5 to 13.0 as the nozzle L/D increased from 2.5 to 3.4 and then decreased to 8.5 as the nozzle L/D increased to 10.3. The back pressure in the extruder barrel was found to be directly proportional to the nozzle L/D ratios with the optimum expansion at approx. 7 MPa. NGKR

- 2042 Inouchi (N), Glover (DV) and Fuwa (H). Properties of residual maize starches following acid hydrolysis. *Starch/Stärke* 39(8); 1987; 284-288

The properties of residual starches following initial acid hydrolysis were investigated. Starch granules of several endosperm mutants of maize, namely-opaque-2, amylose-extender; opaque-2, waxy; opaque-2, dull; opaque-2, and sugary-2; opaque-2 were used. Initial rate of hydrolysis for sugary-2; opaque-2 was fastest and that for amylose-extender opaque-2 was slowest. Following the acid hydrolysis by the enzymatic and chromatographic method, in the initial phase of hydrolysis amylose was preferentially hydrolyzed in the starches, except in the case of waxy; opaque-2. In the case of waxy; opaque-2 the long B chains of amylopectin were preferentially hydrolyzed. The rate of decrease in chain length of amylose-extender; opaque-2 was relatively fast and that of sugary-2; opaque-2 was slow. Fine structures of amorphous regions in these starch granules are discussed. AS

- 2043 Inouchi (N), Glover (DV) and Fuwa (H). Chain length distribution of amylopectins of several single mutants and the normal counterpart, and sugary-1, phytoglycogen in maize (*Zea mays* L.). *Starch/Stärke* 39(8); 1987; 259-266

Beta-Limit dextrans of starches of normal (nonmutant), amylose-extender (ae), dull (du), sugary-2 (su_2) and waxy (wx) maize, and phytoglycogen of sugary-1 (su_1) maize were prepared. The Beta-limit dextrans were successively debranched by isoamylase and pullulanase, and followed by quantitative gel-filtration. The ratio of A to B chains for the ae starch appeared to be high and that for su_1 phyto-glycogen was low. The ratio of short B to long B chains for the du starch was high and that for the ae starch appeared to low. The phyto-glycogen did not contain long B chains. The unit chain-length distribution of amylopectins of the normal, wx, and su_2 starches were similar. Fine structures of maize amylopectins and su_1 phyto-glycogen were modeled and described. AS

Sorghum

Sorghum proteins

- 2044 Bookwalter (GN), Kirleis (AW) and Mertz (ET). In vitro digestibility of protein in milled sorghum and other processed cereals with and without soy fortification. *Journal of Food Science* 52(6); 1987; 1577-1579, 1619

This investigation was carried out to estimate protein digestibility(PD) of milled low tannin sorghum with different levels of bran and germ retention with and without soy fortification and also to determine PD in other processed cereals and soy-cereal blends used in international feeding programmes. It was seen that the PD of uncooked decorticated low tannin yellow sorghum decreased by cooking from 75% to 50% whereas in case of soy-sorghum blend (15%) it decreased from 84% to 72% by cooking. Sorghum PD increased with decreased fat, protein, fiber, Hunter a value and ash content and with increasing Hunter "L" and "b" values. PD of wheat flour, degermed corn meal, rolled oats and bulgur was 80-98% before and 80-94% after cooking whereas PD of 12-15% soy-cereal blends was 88-97% before and 82-94% after cooking. NGKR

- 2045 Van Scoyoc (SW), Ejeta (G) and Axtell (JD). Kernel characteristics and protein fraction changes during seed development of high-lysine and normal sorghums. *Cereal Chemistry* 65(2); 1988; 75-80

Changes in seed characteristics and the proportions and electrophoretic mobilities of Landry-Moureaux (L-M) endosperm protein fractions of high-lysine opaque and normal sorghums were followed during kernel development. Seed wt. and volume increased steadily through 45 days after half-bloom for normal but plateaued a wk earlier for opaque. Percentage embryo of whole seed increased similarly for both lines from an average 2.1 to 8.1% during development. Normal endosperm protein declined 0.7% during seed maturation while that of opaque increased 1.2%. L-M fraction I (albumins and globulins) differed little among lines. Fraction II plus III (total kafirin) accumulation in opaque plateaued two wks before normal, whereas fraction IV plus V (total glutelin) increased more rapidly in opaque than normal endosperms. Sodium dodecyl sulphate polyacrylamide gel electrophoresis of endosperm protein fractions showed few or no differences in banding patterns. It is concluded that the opaque gene(0) manifests itself in a pleiotropic manner with respect to endosperm proteins through quantitative rather than qualitative shifts in major fractions. The enhanced lysine content of opaque results primarily from an increase in relatively lysine-rich glutelins and decrease in lysine-deficient kafirins. AS

Sorghum starch

- 2046 Glennie (CW). Physico-chemical properties of sorghum starch thermally treated by different methods. *Starch/Stärke* 39(8); 1987; 273-276

Pressure cooking and extrusion increased the water solubility of the sorghum starch more than did popping. Popping lead to a significant increase in beta-amylase susceptibility. Gel permeation chromatography revealed a decrease in starch mol. wt. due to extrusion and popping. BV

Sweet corn

- 2047 Deak (T), Heaton (EK), Hung (YC) and Beuchat (LR). Extending the shelf life of fresh sweet corn by shrink-wrapping refrigeration, and irradiation. *Journal of Food Science* 52(6); 1987; 1625-1631

This study reports the results on the effects of shrink wrapping and irradiation on physical, chemical, sensory and microbiological changes in fresh sweet corn stored at 10 °C and 20 °C. The results showed that wrapping essentially eliminated moisture loss and increase in CO₂ with decrease in O₂ concn. with packages. Three fold extension in shelflife is achieved by these effects combined with refrigeration. However the water saturated atmosphere enhanced microbial growth on shrink wrapped corn. The initial microbial population was effectively decreased. NGKR

PULSES

- 2048 Minagawa (K), Ohkura (T), Goshima (G), Miwa (Y) and Tsuge (H). Hysteretic effect of step by step heating on the restriction of gelatinization of legume starch. *Starch/Stärke* 39(7); 1987; 241-246

The restriction of gelatinization of the legume starches, which were isolated from *Phaseolus vulgaris* sp., was studied in terms of enzymatic digestion, light microscopic observation, measurements of X-ray, diffraction, viscosity, swelling power and solubility, when the legume starch slurries were heated in step by step manner at a given rate from moderate temp. up to 90 C. Three legume starches tested showed a remarkable restriction of gelatinization, although these phenomena were not always observed in the legume starch slurry alone. Such restriction of gelatinization, however, was not observed in the waxy starch or starches which contain few amylose fractions. The formation of starch-lipid complex was ruled out as a cause because the defat treatment did not reduce the restricted gelatinization of legume starch and high amylose corn starch. From the data presented it was suggested that physical modification of starch slurry containing amylose fraction induced the hysteretic, mutual alteration of the starch macromolecules. AS

- 2049 Udayasekhara Rao (P) and Deosthale (YG). Polyphenoloxidase activity in germinated legume seeds. *Journal of Food Science* 52(6); 1987; 1549-1551

This study was done to determine the distribution pattern of the polyphenol oxidase (PPO) activity in germinated legumes as well as the distribution pattern of the enzyme in the morphological components. The PPO activity was estimated in the whole seed of germinated chickpea, pigeonpea, green gram and black gram and the increase in enzyme activity on germination was highest in blackgram and lowest in chickpea. Except in blackgram the seed coat fraction was not having any PPO activity as the seed coat of pigeonpea and chickpea contained a heatstable and water soluble PPO inhibitor. The role of PPO in seed germination and the induction of the enzyme on germination did not fully explain the reduction in tannin content of the legume seeds. NGKR

Adzuki beans

- 2050 Kugimiya (M) and Hirata (T). Solubilization of starch by treatment of ann granules with Alpha-amylase. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi)' 34(9); 1987; 581-585 (Ja).

Dried plain Adzuki Ann granules prepared from Adzuki bean (*Vigna angularis*) and samples prepared by grinding an aqueous suspension of the dried Adzuki Ann granules by a homogenizer were used as models of intact and ruptured Ann granules resp. This paper describes a method to determine the proportion of ruptured granules in a standard Ann sample containing intact and ruptured granules in various ratios, by measuring the percentage of starch solubilized by Alpha-amylase. The

dried sample (24 mg) suspended in a buffer (pH 5.9) was allowed to react with Alpha-amylase (1 unit) at 35 °C for 30 min. The suspension was then placed in a boiling water bath for 10 min, cooled and centrifuged, and the amount of starch solubilized was measured. The amount of starch solubilized by the treatment with HCl (0.25 N) instead of Alpha-amylase was regarded as the total amount of starch in the sample. The percentage of starch solubilized by the Alpha-amylase treatment was defined as the ratio of the amount of starch solubilized by the Alpha-amylase treatment to that by the HCl treatment. It was found that the percentage of starch solubilized by the Alpha-amylase treatment was about 2% for the intact granules and about 98% for the ruptured granules and increased linearly with an increasing proportion of ruptured granules in the standard Ann sample. The results suggest that the percentage of starch solubilized by the Alpha-amylase treatment might be applied to the detn. of ruptured and damaged granules in Ann samples. AS

Chickpeas

- 2051 Sosulski (FW) and Gadan (HM). Variations in lipid composition among chickpea cultivars. *Journal of the American Oil Chemists' Society* 65(3); 1988; 369-372

Seeds of 60 cvs of chickpea, *Cicer arietinum*, from three countries were dehulled and the ground cotyledons evaluated for composition of lipids and lipoxygenase. The average lipid contents of Iraqi-, Indian- and Canadian-grown samples were 5.3, 6.6, and 7.3%, resp. While palmitic and stearic acids were uniformly about 9.3 and 1.5% of total fatty acids in the lipids, the proportions of oleic and linoleic acids varied from 36 and 50% for Iraqi samples to 17 and 68% for Canadian-grown samples, resp. Linolenic acid values ranged from 2.1 to 4.5% of total fatty acids and, with lipoxygenase activities averaging one-half that of soybean, the potential for oxidative rancidity in chickpea flours was substantial, especially in northern-grown samples. AS

Fababeans

- 2052 Carnovale (E), Lugaro (E) and Lombardi-Boccia (G). Phytic acid in fababean and pea. Effect on protein availability. *Cereal Chemistry* 65(2); 1988; 114-117

Green beans

- 2053 Watada (AE), Kim (SD), Kim (KS) and Harris (TC). Quality of green beans, bell peppers and spinach stored in polyethylene bags. *Journal of Food Science* 52(6); 1987; 1637-1641

The effect of packaging and warm temp. on wt loss and contents of chlorophyll, vitamin C, vitamin B1 and vitamin B2 of vegetables was studied and results presented. Green beans, bell peppers, and spinach were studied for the above experiments. The above quality attributes decreased during storage and it was greater at 20 °C than at 10 °C at which temp. Packaging and storage temp. generally maintained the var-

ious quality attributes better than unpackaged condition. It was also seen that packaging reduced wt. loss of green beans and spinach kept at 20 C and reduced chlorophyll loss of green beans at 10 C and of spinach at 20 C. Packaging had an effect on vitamin B1 of only spinach held at 10 C and 20 C and had no effect on vitamin B2. With water loss the quality deteriorates further. NGKR

Greengram

- 2054 Sharada (M) and Vimala (V). The efficacy of tricalcium phosphate as pre-storage treatment for greengram stored in rural families (Kurnool district). Indian Journal of Nutrition and Dietetics 24(9); 1988; 260-267

The efficacy of tricalcium phosphate for treating green gram was investigated by treating green gram with 0.5% tricalcium phosphate and storing it for 6 months separately in (i) closely knit jute bag and (ii) plasticised jute bag under farm house conditions in Kurnool District of Andhra Pradesh (India). The stored samples were evaluated for physical analysis, viability, and contents of moisture, uric acid, protein and thiamin after 3 and 6 months storage. Laboratory experiments indicated that treating with 0.2 and 0.5% tricalcium phosphate was very effective in controlling insect attack. There was no significant change in uric acid content, seed viability, protein content and thiamine content of treated and untreated green gram stored for 6 months. Among the two bags the plasticised jute bag was found to be effective to prevent insect infestation. NGKR

Guar beans

- 2055 Rajput (LP), Narasimha Murthy (K) and Ramamani (S). Antinutritive effects and proximate composition of guar meals (Cyamopsis tetragonoloba). Journal of Food Science 52(6); 1987; 1755-1757

The amounts of antinutritional factors and the effects of detoxification procedures on the high yielding cv HG-75 of guar have been determined in cvs of guar meals B-19-155, AG-111, FS-277, H.G-75 and a commercial cv. The detoxification of the high yielding variety HG-75 by extraction with aqueous alcohols or by heat treatment destroyed the haemagglutinin (H) to various degrees. Aqueous alcohol extracted meal was compared with aqueous alcohol treated meal for PER and toxicity to rats. The possibility of denaturation of the guar haemagglutinin rather than extraction of any other toxic factor was indicated. It was thus seen that guar haemagglutinin was partially or wholly responsible for toxicity of guar meal. NGKR

Peas

- 2056 Gueguen (J) and Barbot (J). Quantitative and qualitative variability of pea (Pisum sativum L.) protein composition. Journal of the Science of Food and Agriculture 42(3); 1988; 209-224

The protein content of smooth and wrinkled pea cvs has been evaluated in respect to the proportion of albumins to globulins and

the variability of the vicilin/legumin ratio. The results from the principal components analysis showed a strong negative correlation between albumin and globulin contents and stepwise discriminant analysis demonstrated that two variables, protein content and vicilin/legumin ratio divided the samples into smooth and wrinkled cvs with a percentage of success of 95%. As the protein content decreases the vicilin/legumin ratio tended to increase. NGKR

Pigeon peas

- 2057 Savitri (A), Chandrashekar (A) and Desikachar (HSR). In vitro digestibility of starch from native and germinated pigeon pea (*Cajanus cajan* L.) Starch/Starke 39(8); 1987; 266-270

The in vitro digestibility of native and germinated pigeon pea starches both in raw and cooked forms were investigated. The rate of digestibility (glucoamylase) was different for the two raw starches. There was a preferential utilization of low mol. wt. "amyloses" in the germinated samples, during in vitro enzymatic digestion of the raw granule. On acid hydrolyses, germinated samples produced lower mol. wt. fragments than did raw starch, though the rate of reducing sugar released was not different. It may therefore be concluded that the size of the "amylopectin" molecule is smaller in germinated starch. The easy availability of low mol. wt. "amyloses" may also influence the greater susceptibility of germinated starches to amyolysis even after cooking. AS

Tepary bean

Tepary bean starch

- 2058 Abbas (IR), Scheerens (JC) and Berry (JW). Tepary bean starch Part III: In vitro digestibility. Starch/Starke 39(8); 1987; 280-284

In vitro digestibility of starch from tepary bean, *Phaseolus acutifolius* var. *latifolius*, was determined in comparison with tepary bean flour and maize starch. The extent of sample hydrolysis by Alpha-amylase was measured as mg reducing sugar (maltose) released per 100 mg substrate. After 2 h incubation at 37 °C, values obtained for tepary starch, tepary flour and maize starch treated in various ways were as follows, raw 8.0, 8.6 and 25.6; freeze dried 2.6, 3.2 and 17.8; autoclaved 7.4, 5.7, and 27.7; cooked (15 min) 81.7, 23.1 and 87.8; resp. Raw tepary starch was more resistant to hydrolysis than maize starch due, perhaps, to differences in granule structure and amylose content. Freeze-drying and autoclaving slightly decreased digestibility of both tepary starch and flour. Cooking greatly increased susceptibility to hydrolysis for each substrate. The rate of increase was reduced after 15 min exposure to enzymes, and no appreciable difference was found between cooked tepary, and maize starches. AS

Winged beans

- 2059 Esaka (M), Suzuki (K) and Kubota (K). Effect of microwave heating on lipoxxygenase and trypsin inhibitor activities, and water absorption of winged bean seeds. *Journal of Food Science* 52(6); 1987; 1738-1739

In this investigation the effectiveness of microwave heating for inactivating lipoxxygenase and trypsin inhibitory and for facilitating water absorption of the whole winged bean seed has been determined. This has been achieved after microwave heating for 3.0 and 5.0 min. resp., by soaking the seeds before microwave heating the heating times were considerably decreased and also the rate of water absorption by the seeds was increased. NGKP

OILSEEDS AND NUTS

- 2060 Hudson (BJF). Oilseeds as sources of essential fatty acids. *Human Nutrition: Food Sciences and Nutrition* 41(1); 1987; 1-13

Covers the biochemistry of the essential fatty acids (EFA) essential fatty acid deficiency, EFA from the major commercial oilseeds (sunflower oils, maize germ oils, soybean oils, cottonseed oils, sesame oils, groundnut oils, rapeseed oils, and linseed oils). derived EFA from oilseeds (Evening primrose, blackcurrant and Borge) and processing and storage of high-EFA oils, 45 references. BV

Canola

Canola proteins

- 2061 Paulson (AT) and Tung (MA). Solubility, hydrophobicity and net charge of succinylated canola protein isolate. *Journal of Food Science* 52(6); 1987; 1557-1561, 1569

Effects of succinylation (54% and 84% modification of free amino groups), pH (3.5-11.0) and NaCl concn (0.0-0.7M) on solubility, hydrophobicity and zeta potential (net charge) of canola protein isolate were examined. Succinylation markedly enhanced protein solubility at alkaline and slightly acidic pH while effect of NaCl depended on pH. Surface hydrophobicity (so) decreased as level of succinylation increased. Effect of NaCl varied with pH but in general, so decreased in a curvilinear manner as pH increased. Zeta potential become more electronegative as both succinylation and pH increased, but decreased with addition of NaCl. Hydrophobicity and zeta potential were closely related in a nonlinear inverse manner demonstrating that ionic environment had opposing influences on number of hydrophobic and charged groups on the surface of protein molecules in solution. AS

Groundnuts

- 2062 Rubico (SM), Resurreccion (AVA), Frank (JF) and Beuchat (LR). Suspension stability, texture, and colour of high temperature treated peanut beverage. *Journal of Food Science* 52(6); 1987; 1676-1679

The effects of the two high temp. treatments and homogenization pressures on the composition, emulsion stability, texture, colour and particle size of groundnut based beverages prepared from full fat and partially defatted groundnuts along with their quality evaluation have been presented in this paper. A full fat groundnut and partially defatted groundnut beverage processed under high temp. at 110 C or 121 C for 3 sec with pressures equivalent to 2000 or 3000 psi were evaluated for colour viscosity and chalkiness and these produced very stable emulsions. It was seen that PDPB (partially defatted peanut beverage) was rated significantly darker, more viscous and more chalky than NDPB (non-defatted peanut beverage). In case of NDPB samples homogenized at higher psi were rated lighter than at lower psi. There is found to be correlation between sensory and objective evaluation. NGKR

Rapeseeds

- 2063 Schnug (E) and Kallweit (P). Results of a ring test with the X-ray-fluorescence method for the determination of total glucosinolate content in rapeseed. *FAT Science and Technology* 89(10); 1987; 377-381 (De).

In order to quantify comparability and accuracy of the X-RF method for the detn. of the total glucosinolate content in rapeseed a ring test was established with three laboratories and 24 seed samples in May 1987. The trial yielded the following results: the average value for the reproducibility (r) was 1.6 μ mol/g, the average value for the comparability (R) was 4.0 μ mol/g, the correlation between values derived from X-RF method and HPLC was 0.98; the standard deviation for accuracy 4.0 μ mol/g, by a mathematical correction of the results from the X-RF method for a standard protein content of 22% the correlation coeff. increases to 0.992 and the standard deviation of accuracy decreases to 2.5 μ mol/g. AS

- 2064 Sendfeld (A), Fiebig (H-J) and Aitzetmuller (K). Determination of total glucosinolate content in rapeseed by ion chromatography of enzymatically released sulphate. *FAT Science and Technology* 90(3); 1988; 83-85 (De).

An alternative method for the detn. of the total glucosinolate in rapeseed has been developed. Sulphate is released from glucosinolate enzymatically, and determined quantitatively by ion-chromatography. A back calculation based on the quantity of sulphate released gives amount of glucosinolate, on equimolar basis, present in rapeseed. The method is simple and more accurate compare to classical method of the estimation of allylisothiocyanate. N

Rapeseed flour

- 2065 Rathy Podnnampalam, Vijayalakshmi (MA), Lemieux (L) and Amiot (J). Effect of acetylation on composition of phenolic acids and proteolysis of rapeseed flour. *Journal of Food Science* 52(6); 1987; 1552-1556, 1594

Soybeans

- 2066 Shih (FF). Deamidation of protein in a soy extract by ion exchange resin catalysis. *Journal of Food Science* 52(6); 1987; 1529-1531

This investigation was carried out to explore the potential of Dowex 50 resin in the catalysis soy protein deamidation to study the conditions for regulating the extent of peptide bond hydrolysis in deamidation and to investigate the effect of deamidation of functional properties of the proteins. Defatted soya flakes was used for deamidation of its extract and functionality analysis of the protein deamidation and peptide bond hydrolysis was studied. The results showed that in the presence of Dowex 50 resin soya protein underwent about 1.5 to 3.0 times as much deamidation depending on temperature as in case of protein in the absence of resin. By increasing the temperature from 58 C to 85 C both deamidation and peptide hydrolysis increased and this ratio decreased with temperature. The properties of deamidated protein improved in respect to solubility water binding, whippability and the ability to emulsify oil. NGKR

- 2067 Singh (BPN) and Kulshrestha (SP). Kinetics of water sorption by soybean and pigeon pea grains. *Journal of Food Science* 52(6); 1987; 1538-1541, 1544

This study examined water sorption by soybean and pigeon pea in terms of a much simpler kinetic model involving a single rate constant. The temp. dependence of the rate constant followed Arrhenius relation. It was found that swelling of grains due to water sorption was slightly less than the volume of water imbibed and this loss related to the energy of activation of the water sorption process. NGKR

- 2068 Viera (FB), Barragan (BB) and Busto (BL). Reversible immobilization of soybean Beta-amylase on phenylboronate-agarose. *Biotechnology and Bioengineering* 31(7); 1988; 711-713

Soy products

Soy curd

- 2069 Miskovsky (A) and Stone (MB). Effects of chemical preservatives on storage and nutrient composition of soybean curd. *Journal of Food Science* 52(6); 1987; 1535-1537

The effects of selected chemical preservatives in immersion solutions to extend the shelflife of soybean curd produced from hot grind soy milk and also on selected ingredients have been investigated. The results showed that acetic acid or potassium sorbate + acetic acid maintained low viable cell counts in soybean curd immersion solutions but had no effect on soybean curd nutritional quality during storage at 4-7 C for 21 days. Thiamin and riboflavin decreased during storage representing leaching of the vitamins into immersion solutions. After 14 days of storage soybean curd protein decreased and carbohydrate increased whereas protein and arginine decreased after 14 days of storage but no loss was reported in other amino

acids. NGKR

Soy milk

- 2070 Miskovsky (A) and Stone (MB). Effect of processing on curd yield and nutrient composition of rapid hydration hydrothermal cooking and traditionally processed soy milk and soybean curd. *Journal of Food Science* 52(6); 1987; 1542-1544

The effects of processing on curd yield and nutrient composition of soy milk processed by RHHTC (Rapid Hydration Hydrothermal cooking) and traditional method have been studied. Soy milk was extracted and soybean curd was produced following procedure of lim with modifications and traditionally extracted soy milk was also used for curd preparation. The data on soy milk and curd composition showed that RHHTC milk had higher thiamin and protein as compared to traditional milk whereas in case of curd the protein was higher in traditional curd and carbohydrate and ash were lower as compared to RHHTC curd. There was found to be variation in amino acid composition of milk and curds. RHHTC method gave higher and yields than traditional method. NGKR

Tempeh

- 2071 Suparmo Markakis (P). Tempeh prepared from germinated soybeans. *Journal of Food Science* 52(6); 1987; 1736-1737

In this investigation tempeh prepared from slightly germinated soybeans and its nutritional qualities were compared with those of traditional tempeh. As a result of decreases of oligosaccharide (sucrose, raffinose and stachyose) and phytate contents due to 12-24 h germination and tempeh fermentation of the germinated soybeans the % protein rose (% N x 6.25). However, the soybean lectins were not affected by the germination process but were inactivated during the tempeh preparation. There was increase of PER from 2.19 to 2.26 which is not statistically significant. NGKR

TUBERS AND VEGETABLES

Root vegetables

Carrots

- 2072 Nicolas (M), Betton (M), Chambarel (A) and Duprat (F). Heat and mass transfer during blanching of vegetables. Mathematical modelling by the finite element method of nitrate leaching from fleshy root of carrot. *Sciences des Aliments* 7(4); 1987; 603-628

Finite element method is used as a tool to predict nitrate diffusion and heat transfer during carrot blanching. The mathematical model developed is able to take into account the root geometry and the initial nitrate concn. distribution. It has provisions to incorporate

temp. dependency of heat and mass transfer coeff. mechanical and bio-chemical properties like processing variables (temp. relative proportion of blanch water and carrot). It can be used with different mass diffusivity values according to various parts of the vegetables and/or nitrate divided into eight-node isoparametric quadrilateral elements. Implicit and semi-implicit procedures (EULER, CRANK-NICHOLSON) are used to study time-dependent diffusion. As example, calculations are performed considering temp-dependent thermal and mass diffusivities. Geometry effects on blanching efficiency are pointed out using whole carrot (where diffusion is mainly radial) and carrot slice of 1 cm height and 3 cm diameter (where axial diffusion prevails). AS

Cassava

- 2073 Emilia Abraham (T), Krishnaswamy (C) and Ramakrishna (SV). Effect of hydrolysis conditions of cassava on the oligosaccharide profile and alcohol fermentation. *Starch/Stärke* 39(7); 1987; 237-240

Various hydrolysis procedures for saccharification of cassava starch were tried to maximise glucose content in the hydrolysate. The malto-oligosaccharide profiles from HPLC analysis of hydrolysates prepared by acid, acid enzyme and enzyme-enzyme showed that the hydrolysate prepared by acid contains malto-oligosaccharides up to DP10, whereas with acid-enzyme and enzyme-enzyme process their presence is negligible. A commercial hydrolysate showed less amount of glucose and various sugars up to DP10. The fermentability of hydrolysates were compared and enzyme-enzyme hydrolysate is found to be best. AS

- 2074 Osuntogun (BA), Adewusi (SRA), Telek (L) and Oke (OL). The effect of tannin content on the nutritive value of some leaf protein concentrates. *Human Nutrition: Food Sciences and Nutrition* 41F(1); 1987; 41-46

Some leaf protein conc., (LPC) from tropical plants were evaluated nutritionally by both in vitro and in vivo methods. The LPC from *Manihot esculenta* (Cassava) has the highest tannin content of 13.5 mg/g sample and *Desmodium distortum* the lowest (2.0 mg/g sample). The available lysine of the LPC samples ranged from 3.6 to 5.8 g lys/16 g N and was negatively correlated with the tannin content ($r = -0.670$; P less than or equal to 0.01). In vitro digestibility was 0.71-0.88 and showed a negative correlation with tannin content ($r = 0.908$; P less than or equal to 0.001). Cassava and *L. leucocephala* LPC samples gave very poor growth performances while *Desmodium distortum*, *Brassica napus*, *Phaseolus calcaratus*, *Phaseolus sathywide* and *Psophocarpus tetragonolobus* gave good results. The PER and tannin content of the LPC samples have an inverse relationship ($r = -0.928$; P less than or equal to 0.001). AS

- 2075 Srikantha (S), Jaleel (SA), Ghildyal (NP), Lonsane (BK) and Karanth (NG). Novel technique for saccharification of cassava fibrous waste for alcohol production. *Starch/Stärke* 39(7); 1987; 234-237

A novel technique, involving the hydrolysis of starch present in

cassava fibrous waste in shallow layer in stainless steel trays, is developed to facilitate the use of higher slurry concn. The use of slurry containing 30% solids, 4% sulphuric acid, 30 min saccharification time at 121 C resulted in the complete conversion of the starch into reducing sugars. The spent residue, after separation of the hydrolysis, contained about 24% of the total sugars formed and these were recovered to the extent of 90-94% by using a counter-current extraction technique. A large scale saccharification of a 75 kg batch gave 75 l pooled hydrolysate containing 15% reducing sugars. An overall process efficiency of 76.4% was observed with the fermentation of hydrolysate pooled with the counter-current extract for alcohol production. However, fermentation of the whole saccharified pulp without the separation of the hydrolysate and acid-enzyme hydrolysis of the waste gave lower efficiencies. AS

Sugar beets

- 2076 Senge (B), Schmidt (P-V) and Manzke (E). Influence of the storage time on the discharge capacity of axial-flow ventilators for the aeration of sugar beets. *Lebensmittelindustrie* 34(5); 1987; 209-210

Tubers

Potatoes

- 2077 Masamura (A), Sado (H), Honda (T), Shimizu (M), Nabetani (H), Nakajima (M) and Watanabe (A). Drying of potato by far infrared radiation. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi)' 35(5); 1988; 309-314 (Ja).

Drying exp. of potato were carried out, using some far infrared radiation heaters. The relation between supplied electric power and surface temp. of heaters was discussed. Results indicated that (1) far infrared heaters which were used in our exp. the heater with the strongest emissive power provided the largest drying rate; (2) When supplied electric power to far infrared heaters was strong, temp. of the samples was high, drying rate became large, and constant rate period was short. When supplied electric power was weak, constant-rate period became long; and (3) Surface temp. of far infrared heaters was lower than that of blackbody, because the Joule's heat is deprived from the surface of the heater to the surrounding air by natural convection. BHS

Potato starch

- 2078 Leszczynski (W). Attempts to simplify the methods of determination of potato starch granularity. *Starch/Starke* 39(7); 1987; 223-225

The potato starch granularity was examined using a sedimentation balance avoiding the detn. of sp. gr. of the granules for each starch sample. Distilled water was used as the liquid phase. It was found that the stipulated values of sp. gr. of the granules, i.e., 1.56 and

1.59 g/m³ can be accepted when methanol is used as the liquid phase. Substitution of methanol for the distilled water resulted in slight errors in the detn. However, when starch was kept in water for 2 and 4 h then the results showed large discrepancies. AS

Sweet potatoes

- 2079 Bassa (IA) and Francis (FJ). Stability of anthocyanins from sweet potatoes in a model beverage. *Journal of Food Science* 52(6); 1987; 1753-1754

This investigation was designed to study the stability of sweet potato pigments and to test the concept of acylation attributing stability to the pigment in a model beverage. This was done by storing at room temp. for 1 yr model beverages containing a citrate-phosphate buffer at pH 2.8 13% sucrose and a colourant. The colourants studied consisted of pigment extracts from red sweet potatoes the same extract with the acylgroups removed, cyanidin-3-glucoside from blackberries and a commercial sample of enocyanin from grapes. The results showed that the sweet potato pigments were the most stable, closely followed by those from black berries. The deacylated samples and those containing enocyanin were found to be much less stable as judged by colour measurements and analysis of pigments. NGKR

Yam

- 2080 Kouassi (B), Diopoh (J), Leroy (Y) and Fournet (B). Total amino acids and fatty acids composition of yam (*Dioscorea*) tubers and their evolution during storage. *Journal of the Science of Food and Agriculture* 42(3); 1988; 273-285

In this study the effect of storage on the amino acid and fatty acid composition and contents of edible yam tubers (*Dioscorea*) grown in the Ivory coast has been presented. The qualitative and quantitative analysis of total amino acids from 6 yam species and fatty acids from 5 yam species has been done by GLC and fatty acid analysis showed 11 saturated fatty acids with 12 to 25 carbon atoms and five unsaturated fatty acid with 16, 18 or 20 carbon atoms were identified. Palmitic acid (16:0) stearic acid (18:0), oleic acid (18:1), linoleic (18:2) and linolenic acid (18:3) are the most abundant fatty acids found in yam tubers. For amino acids analysis the results obtained showed that hydrochloric acid hydrolysates of yam flours contain most of the amino acids from proteins in high concn and comparative analysis stored for 1, 5 and 8 months after harvest showed that total amino acids decreases slightly and fatty acid increases during storage and no change was observed in yams stored at 25 C for several months. NGKR

Vegetables

- 2081 Hirata (K), Chachin (K) and Iwata (T). The quality changes of some vegetables used in the tropical and subtropical area during storage at various temperatures. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi)' 34(9); 1987; 566-573 (Ja).

To investigate the quality changes during storage, edible amaranth (*Amaranthus mangostanus* L.) soup celery (*Apium graveolens* L. var. *Secalinum* aleff), Malabar spinach (*Basella rubra* L. var. *alba* Makino), water convolvulus (*Ipomoea aquatica* Forsk.), chinese flowering cabbage (*Brassica parachinensis* Bail.) and pak-choi (*Brassica chinensis* L.) were sealed in 0.03 mm polyethylene bags and held at 1, 6, 20 and 30 C resp. At 20 and 30 C storage, yellowing of leaves was mainly responsible to quality deterioration, while Malabar spinach and pak-choi kept green for relatively long period. Chilling injury was observed in water convolvulus and edible amaranth at 1 and 6 C, and in Malabar spinach at 1 C. The injury was manifested as the browning of leaves in the former 2 species, whereas it was as the pitting and softening (loss of turgidity) of leaves in the latter species. Other vegetables were kept good as storage temp. lowered. Decrease of ascorbic acid (ASA) content in edible amaranth, soup celery and pak-choi was retarded with low temp. storage. In Malabar spinach and water convolvulus, the ASA content decreased was retarded at low temp. In Malabar spinach, the decrease of ASA content was very slow even at 30 C. Decrease of chlorophyll content was retarded at low temp. storage, except soup celery which showed no distinctive change among temp. Free amino acid content tended to increase with raising of storage temp. Total phenol content showed a temporary rise and then decreased in water convolvulus stored at low temp. In other vegetables, the level was almost constant. AS

- 2082 Schuster (BE) and Lee (K). Nitrate and nitrite methods of analysis and levels in raw carrots, processed carrots and in selected vegetables and grain products. *Journal of Food Science* 52(6); 1987; 1632-1636, 1641

In this study the contemporary analytical methods for nitrate and nitrite in vegetables and grains were explored with the object of better estimating and lowering nitrate and nitrite exposure. Recently developed HPLC method was compared with other methods to study the nitrate distribution in carrot tissue and the effect of processing on nitrate and nitrite content. The nitrate concn by HPLC method varied greatly within and between vegetables ranging from 1 μ mol/100 g in mushrooms to 5000 μ mol/100 g in celery and averaging 9.7 plus or minus 4.4 μ mol/100 g in grains. No nitrite was detected in either vegetables or grains. Nitrate was more in the core and storage at -18 C for 10 wk did not alter nitrate levels without nitrite development, even after 10 wk of canned storage inspite of nitrate losses. NGKR

Leafy vegetables

Cabbage

- 2083 Yano (M), Itoh (H) and Saijo (R). Allyl isothiocyanate and its contribution to pungency in cabbage (*Brassica Oleracea* L.). *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi') 34(9); 1987; 608-611

A close correlation was demonstrated between the pungency of

fresh cabbage evaluated by sensory tests and the concn. of allyl isothiocyanate (AITC) formed in macerated cabbage with 39 cvs commonly grown in Japan. Most of the cvs tested contained AITC lower than 0.5 mg/100g, and had no pungency. Only 3 cvs containing AITC higher than 2.0 mg/100g showed a pungency. It was concluded that there is virtually no problem as far as the pungency is concerned, when cabbages grown in Japan are consumed raw. AS

Tomatoes

- 2084 Tanglertpaibul (T) and Rao (MA). Intrinsic viscosity of tomato serum as affected by methods of determination and methods of processing concentration. Journal of Food Science 52(6); 1987; 1642-1645, 1688

In this study the magnitudes of intrinsic viscosity of tomato serum determined by different methods based on relative viscosity were compared and also the changes in the magnitudes of intrinsic viscosity of tomato serum were related to different processing methods of tomato juice and concn. These studies revealed that intrinsic viscosities of serums from concn. obtained by evaporation of the juice were lower than those obtained by evaporation of serum and reverse osmosis concn of serum. Their magnitudes also were found to be lower for serums from diluted and sheared concn. NGKR

Tomato paste

- 2085 Chou (TD) and Kokini (JL). Rheological properties and conformation of tomato paste pectins, citrus and apple pectins. Journal of Food Science 52(6); 1987; 1658-1664

Rheological properties of dilute and concentrated solutions of water soluble, alcohol-precipitated tomato pectins from hot break and cold break tomato paste as well as alcohol-precipitated commercially available apple and citrus pectins were studied. Superposition of rheological data was possible when n_{sp} was plotted vs $C(n)$ and when n/n was plotted vs Tr . The slope of n_{sp} vs CMW plot and the limiting slope of n/n vs suggested that citrus, apple and hot break tomato pectin had random coil conformation while cold break tomato pectin had a more rigid conformation. Tomato processing had significant influence on the chain length and rheological properties of tomato pectins.

FRUITS

- 2086 Bolin (HR) and Huxsoll (CC). Scanning electron microscope/imag analyzer determination of dimensional postharvest changes in fruit cells. Journal of Food Science 52(6); 1987; 1649-1650, 1698

Apples

- 2087 Bolin (HR) and Steele (RJ). Nonenzymatic browning in dried apples during storage. *Journal of Food Science* 52(6); 1987; 1654-1657

This investigation was carried out to find out the percentage of nonenzymatic browning reaction caused by the non-oxidative or Maillard reaction as against oxidative type and also investigate other possible methods of reducing the nonenzymatic browning in stored dried fruit products. The results showed that calcium treatment reduced rate of darkening but manganese and tin compound addition was ineffective. Oxygen scavengers benefited during packaging of dried apples decreased darkening during storage. It was found that about 20% of nonenzymatic browning was due to nonoxidative or Maillard type and 70% due to oxidative reactions. NGKR

- 2088 Chen (H), Rubenthaler (GL), Kleung (H) and Baranowski (JD). Chemical, physical and baking properties of apple fiber compared with wheat and oat bran. *Cereal Chemistry* 65(3); 1988; 244-247

Apple fiber was characterized by chemical and physical methods and found to be a good dietary fiber source and superior water binder to wheat and oat brans. Addition of 4% hydrated apple fiber to bread reduced loaf volume by 14%. Apple fiber was added to cookie and muffin at a replacement level of at least 4% without a large adverse effect on cookie and muffin quality. AS

- 2089 Sapers (GM) and Ziolkowski (MA). Comparison of erythorbic and ascorbic acids as inhibitors of enzymatic browning in apple. *Journal of Food Science* 52(6); 1987; 1732-1733, 1747

In this investigation the effectiveness of ascorbic acid (AA) and erythorbic acid (EA) in inhibiting enzymatic browning at cut surfaces of apple and in raw apple juice was determined by tristimulus colorimetry. It was seen that treatment with 0.8 -1.6% solutions of AA and EA of Red Delicious and Winesap apples showed longer lags before the onset of browning with the former compound. AA and EA were similar in effectiveness in apple juice. NGKR

Avocados

- 2090 Kahn (V). Characterization of starch isolated from avocado seeds *Journal of Food Science* 52(6); 1987; 1646-1648

In this study the characteristics of avocado seed starch has been presented. It was seen that starch granules of avocado seeds were oval shaped with a relatively smooth surface and an average diameter of 5-35 μ and the starch was non-ionic and not waxy. The gelatinisation temp. range of the starch was 62-75 °C. Brabender viscosity curves showed that the starch had restricted swelling with no pronounced pasting peak but with good pasting stability and average set back on cooling. It was also seen to exhibit type B X-ray diffraction pattern. NGKR

Berry

Blueberries

- 2091 Yang (APP), Wills (C) and Yang (TCS). Use of combination process of osmotic dehydration and freeze drying to produce a raisin-type lowbush blueberry product. *Journal of Food Science* 52(6); 1987; 1651-1653, 1664

In this investigation development studies on a semi-moist raisin type snack prepared from low bush blueberries through a sequence of osmotic and freeze drying and final thermal conditioning together with process variations, quality of the finished products and their storage stability have been discussed. The qualities of osmotically dehydrated blueberries, residual syrup and final products were studied using various ratios of berry to sugar. An accelerated storage test was also conducted. It was seen that individually quick frozen berries were preferred to fresh berries as a starting material and a berry sugar ratio of 3:1 or 4:1 gives final products with good texture, flavour, overall quality and a shelflife of 16 and 64 months at 25 C and 5 C storage respectively. NGKR

Citrus fruits

- 2092 Chatterjee (P) and Chatterjee (A). A dihydroflavonol-O-glycoside of *Citrus sinensis*. *Phytochemistry* 27(3); 1988; 946-947

Reports the isolation and characterisation of dihydrokaenferol-4-methyl ether-7-O-rhamnoside from the pulp of mature fruit of *Citrus sinensis* L. BV

Oranges

- 2093 Tadeo (JL), Ortiz (JM) and Estelles (A). Sugar changes in clementine and orange fruit during ripening. *Journal of Horticultural Science* 62(4); 1987; 531-537

An accumulation of sugars was observed in all cvs (Fina, Oroval, Hernandina, Clementines, Naveling, Washington Navel and Navelate oranges) during ripening, mainly due to an increase of sucrose in the juice and of reducing sugars in the rind. Cv Hernandina, a late clementine, showed a slower rate of sugar increase in rind. BV

Mangoes

- 2094 Pruthi (JS) and Tectia (MS). Studies on the manufacture, composition, packaging, storage and quality standards of raw mango powder or 'Amchur'. *Indian Cocoa, Arecanut & Spices Journal* 11(1); 1987; 21-28

Thirty commercial Amchur (dried flesh of unripe but mature mangoes used as acidulant in Indian food preparations) samples manufactured in different places in India were analysed for moisture, ether extract, protein, crude fibre, total ash, acid insoluble ash, acidity, pH, reducing, non-reducing and total sugars and common salt.

and were compared with laboratory prepared Amchur which was also packed and sealed in (i) single polyethylene bags (200 gauge), (ii) double polyethylene bags, (200 gauge), (iii) single polyethylene bags, (200 gauge) kept in friction top tins and (iv) glass jars and stored at room temp. (12-25 C) for 3 and 6 months and the changes in moisture, acidity, sugars and colour were recorded. Frequency distribution histograms constructed for the different chemical parameters indicate that the commercial samples have higher added common salt content, and crude fibre, reducing sugars and total sugars; commercial samples were lower in acidity than the laboratory prepared samples. Studies on sorption isotherms revealed that Amchur was quite hygroscopic and picked up moisture even at 50% RH. The E.R.H. of mango powder (initial moisture 7.3%) was 46%. Above 70% RH deterioration in colour, texture and mould infestation took place. Storage studies indicated that Amchur could be kept in friction-top tin containers for about 6 months. Slight darkening was observed in 3 months in polyethylene bag packed samples and in glass jars. Slight decrease in acidity during storage was also observed. KAR

Yadav (SS), Prasad (A) and Singh (AR). Studies on the seed kernel of mango (*Mangifera indica* L.) with special reference to its oil content. *Journal of the Oil Technologists' Association of India* 19(3); 1987; 65-66

Oil refractive index, I.V. and free fatty acid content of 20 var. of mango kernels were determined in 1981-82 and 1982-83 seasons. Oil content was highest in Dashehari var. (17.6%) followed by Longra (8.6%). The range in values for refractive index was 1.460 to 1.470 and for I.V. was 35.4 to 57.9 for the 20 mango var. Dashehari showed max. I. V. of 57.9. The fatty acid content ranged from 2.80 to 6.2%; var. Surkha had the min. fatty acid content of 2.80% and Aman Angoori had the max. fatty acid content of 6.2%. KAR

Raisins

Akrida-Demertzi (K), Demertiziz (PG) and Koutinas (AA). pH and trace elements content in raisin extract for industrial scale alcohol fermentation. *Biotechnology and Bioengineering* 31(7); 1988; 666-669

In Greece alcohols are produced by using raisins and sugar beet molasses as raw materials. The ability of all kinds of Greek raisins for industrial scale fermentation related to pH and trace element contents is discussed. pH 3.2 yielded larger ethanol productivities from raisin extracts. The raisin variety Trechumena contains smallest amount of Cu and variety psila contain 7 times higher concn. than Trechumena. This is in agreement with the fact that Psila in the worst kind of raisin and Trechumena the best for spirit production. This observation is related with experimental results obtained by alcoholic fermentation in a series of synthetic media containing saccharate and different concn. of copper. GAR

CONFECTIONERY, STARCH AND SUGAR

Confectionery

- 2097 Hartel (RW). Sugar crystallization in confectionery products. *Manufacturing Confectioner* 68(10); 1987; 59-65

Briefly reviews aspects of sugar crystallization. Covers solutions and solubility, formation of the solid phase and crystal growth and ripening, physical parameters (super saturation, temperature, water content, agitation, types and concn. of sugars and the addition of other additives) that influence sugar crystallization in confectionery products. BV

- 2098 Herzing (AG). High stability oil applications in confectionery products. *Manufacturing Confectioner* 68(10); 1987; 53-58

This review covers high stability oils, off-flavour development (hydrolysis and oxidation) oxidation detn. by peroxide value method, AOM stability test, attributes to oxidative stability (fatty acid composition, antioxidant content), tocopherol isomers, synthetic antioxidants and application of high stability oil (frying media, release agent and protective coating, couverture fat, filling fat carrier for colours and flavours). BV

Chocolates

- 2099 Anon. Method for determination of Casson yield value and plastic viscosity for chocolate. *Manufacturing Confectioner* 68(1); 1988; 72-75

The method for detn. of Casson yield value and Casson plastic viscosity for dark and milk chocolates is described in detail. The procedure, calculation and interpretation of results are described. The method is the result of a collaborative study by Chocolate Manufacturers Association and National Confectioners Association. SYR

- 2100 Anon. Application of the Casson viscosity method for chocolate to the Brookfield viscometer. *Manufacturing Confectioner* 68(1); 1988; 76-81

The paper provides a detailed method for applying the 'method for detn. of Casson yield value and plastic viscosity for chocolate', the official method published by the Chocolate Manufacturers Association and the National Confectioners Association, to a Brookfield viscometer. The application of the method, principles involved, the detailed procedure, calculation and expression of results are described in detail. SYR

Pastels

- 2101 Hogenbirk (G). Retention of colour in pastel coatings. *Manufacturing Confectioner* 68(10); 1987; 66-70

Discusses attractiveness of pastel coatings (flavour expectation and eye appeal and behaviour of the system), properties of a good pastel coloured coating and/or compound (colour, gross, flavour, pleasant melting behaviour, flavour and colour combination, satisfactory coating properties, required viscosity, effect of the colouring substances, colour classification and selection, composition of basic coatings, shelf life tests, effects of colourings on coatings). BV

Starch

- 102 Suzuki (Y) and Shinji (M). An improved method of the purification of *Bacillus stearothermophilus* α -1, 4-glucosidase active on soluble starch by the use of an immunosorbent. *Starch/Stärke* 39(8); 1987; 271-273

A p-nitrophenyl- α -D-glucopyranoside-hydrolyzing α -1, 4-glucosidase (α -D-glucoside glucohydrolase, EC 3.2.1.20) highly active on soluble starch of *Bacillus stearothermophilus* ATCC 12016 was 366-fold purified to homogeneity with a yield of 31% by a simple five-step procedure containing as the most efficient step the enzyme elution from immunosorbent with a pH 11 medium including 50% (w/v) glycerol. The enzyme specific activity was 148 mol p-nitrophenyl- α -D-glucopyranoside hydrolyzed/min/mg protein at 60 °C and pH 6.8. The enzyme cleft 71% of glucosidic linkages in α -limit dextrin (average polymerization degree = 9) made from potato amylopectin with *Bacillus subtilis* α -amylase. The products of α -limit dextrin were hardly hydrolyzed by *Bacillus thermoglucosidasius* oligo-1, 6-glucosidase (dextrin 6-glucanohydrolase, EC 3.2.1.10). AS

- 103 Vasudeva Singh) and Zakiuddin Ali (S). Estimation of phosphorus in native and modified starches. Improvement in the molybdovanadophosphoric acid method. *Starch/Stärke* 39(8); 1987; 277-279

The spectrophotometric method for estimation of phosphorus based on molybdovanadophosphoric acid complex has been improved for its sensitivity (8-10 fold) by reducing the reagents concn. to one third and measuring the absorbance at its λ max (355 nm). The range of the method is brought down to 0.5 μ g to 7 μ /ml for 1 cm light path. Phosphorus content of potato starch remained unchanged upon acid modification or oxidation with hypochlorite. Maize and tapioca starch, on the other hand, lost about 30-40% of their phosphorus upon acid modification. The difference probably lays in the state of phosphorus in the respective starch granules. AS

- 104 Zeleznak (KJ) and Hosney (RC). Characterization of starch from bread aged at different temperatures. *Starch/Stärke* 39(7); 1987; 231-233

A series of bread samples stored at various temp. (4, 25 and 40 °C) were analysed by differential scanning calorimetry (DSC) to determine if retrogradation (quantified by DSC enthalpy values) and storage temp. were correlated. The increase in enthalpy values during storage time was dependent on storage temp. However, the rate of recrystallization was not linear at any of the temp. studied. The net result was that the enthalpy values tended to converge with time, irrespective of

storage temp. Another effect of the increased storage temp. was an increase in the peak temp. (T_p) of the amylopectin endotherm. This indicates either that storage temp. affects the type of crystal being formed as the starch recrystallizes, or that annealing of crystals occurs at the higher storage temp. X-ray diffractometry of starch isolated from the crumb gave similar diffraction patterns indicating no difference in crystal type among the treatments. In addition, the DSC endotherm became sharper at the higher temp. Thus, the increase in T_p was apparently the result of annealing of the crystals at the higher storage temp. AS

Sugar

- 2105 Gurumurthy (BS). Storage bins and automatic weighment for sugar. Indian Sugar 38(2); 1988; 87-90

A storage bin (double) constructed at the Ponni Sugars & Chemicals Ltd. Erode (India) with a capacity to store 885 quintals of sugar after studying the material flow characteristics is described. This is attached with the automatic weighing scale and automatic stitching device. The bin is diagrammatically presented and the construction cost per bin is 0.581 million rupees. MVG

- 2106 Krause (EW). New equipment and processes in sugar industry. Indian Sugar 38(2); 1988; 77-85

Latest equipments developed in sugar industry for filtration, evaporation and crystallization, centrifugation, pumping and finally the instrumentation and process control have been reviewed. This article is to be concluded in subsequent issue. MVG

Glucose

- 2107 Kim (JY) and Lee (YH). Fast response glucose microprobe. Biotechnology and Bioengineering 31(7); 1988; 755-758

A micro version of glucose probe based on glucose oxidase has been fabricated. It is fast responding glucose microprobe with a tip diameter of four micrometers. The microprobe exhibited a linear response to glucose concn. up to 3 g/l and a 98% response time of less than one second. The microprobe is shown to measure local glucose concn. GAR

BAKERY PRODUCTS

- 2108 Brummer (J-M), Brack (G) and Seibel (W). Current situation of the preservation of baked products. Getreide, Mehl und Brot 42(1); 1988; 17-21 (De).

On the basis of animal experiments the permission of the health clearance for use of propionic acid as a preservative has been withdrawn and instead use of sorbic acid has been allowed as

replacement. Incorporation of sorbic acid in the acid-dough bread does not pose any technological difficulties. In the case of unacidified bread a mold-free storage period of 9 to 11 days could be achieved by addition of acidic dough (3-5%). In the case of oat box-rolls addition of 0.07 to 0.1% is recommended. Addition of 0.15% sorbic acid is sufficient for stirred cakes. No distinct differences in the taste were noticed. SZA

- 2109 Seibel (W), Nestl (B) and Hillgartner (K). DLG-quality test for cereal based food (Systematics, definitions and testing method). Getreide, Mehl und Brot 42(1); 1988; 21-23 (De).

A 5-point scoring system for sensory evaluation of cereal based foods, developed and used by DLG (German Agricultural Association, an old independent organisation for testing of foods) is described. Cereal-based food products is classified into 9 groups and definitions and explanations for each group have been listed. A score card has been presented for sensory evaluation of the product on a 5-point scale for various sensory attributes viz 1. Appearance, 2. Surface/covering, colour, 3. Consistency and 4. Odour, taste. SZA

Bread

- 2110 Dagher (SM), Shadarevian (S) and Birbari (W). Preparation of high bran Arabic bread with low phytic acid content. Journal of Food Science 52(6); 1987; 1600-1603

In this investigation the fate of phytic acid during incubation of wheat bran and the possibilities of preparing high bran bread with very low phytic acid content were studied. It was seen by incubation of wheat bran at pH 5.2 and at temp. of 55 C for different periods of time the level of inorganic phosphorus and inositol phosphates increase with a simultaneous decrease in phytic acid content. By preparing bread with this bran upto 32% of the phytic acid was lost. With incorporation of wheat malt in the bread formula no loss of phytic acid occurred whereas incubation of bran in an acidic medium followed by repeated decantation of incubated liquid it was possible to produce a high bran bread almost free of phytic acid. NGKR

- 2111 de Stefanis (VA), Ranum (PM) and Erickson (RW). The effect of metal ions on bromate oxidation during breadmaking. Cereal Chemistry 65(3); 1988; 257-261

A rapid colorimetric method was developed to identify metal ions that accelerate the action of potassium bromate. The metal ions which are generally encountered during breadmaking such as Cu^{2+} , Fe^{2+} and other metal ions such as vanadium, silver and mercury showed positive effect on bromate. The rate of acceleration of bromate oxidation was proportional to the concn. of either vanadyl acetate or cupric sulphate (0-50 p.p.m) and ferrous sulphate at 100-150 p.p.m. In the latter case a concn of more than 150 p.p.m. affected the loaf quality. Fe^{2+} ions were effective than Fe^{3+} ions. Copper operated as independent oxidising agent similar to potassium bromate whereas vanadate and ferrous ions behaved as bromate catalysts. Though these ions had

no effect on either ascorbic acid or potassium iodate vanadium did catalyse the action of dicarbonamide. AR

- 2112 Leissner (O). A comparison of the effect of different polymorphic forms of lipids in breadmaking. *Cereal Chemistry* 65(3); 1988; 202-207

Adding fat crystals to a wheat flour dough increases the loaf volume, this study investigated the physical state of added fats during breadmaking. Fats in different polymorphic forms were added to doughs that were baked in an electric resistance baking chamber. In addition, an 1, 2-phase, a so-called microemulsion was used. A kinetic study, with different temp. rates, was also performed. The beta form increased the bread volume in a pronounced way and more than the other fat polymorphic forms. An addition of lipid 1, 2-phase makes only a minor contribution to loaf volume. AS

- 2113 Lykken (GI), Hunt (JR), Nielsen (EJ) and Dintzis (FR). Availability of soybeans hull iron fed to humans in a mixed Western meal. *Journal of Food Science* 52(6); 1987; 1545-1548

Century soybeans were grown in greenhouse and labeled by stem injection of iron-59. The intrinsically labeled soybean hulls were incorporated into bread rolls and fed in mixed meals containing beef to six free-living female volunteers. Iron-59 retention, measured by whole similar meals containing extrinsically labeled soybean hulls or bakery grade ferrous sulfate. Iron-59 retention averaged 23% from meals containing the intrinsically labeled soybean hulls, 18% from meals containing extrinsically labeled soybean hulls, and 22% from meals containing bakery grade ferrous sulfate. There were no statistically significant differences in retention among the various iron sources, indicating that soybean hulls were an excellent source of iron for bread enrichment. AS

- 2114 Menkovska (M), Pomeranz (Y), Lookhart (GL) and Shogren (MD). Gliadin in crumb of bread from high-protein wheat flours of varied breadmaking potential. *Cereal Chemistry* 65(3); 1988; 198-201

In polyacrylamide gel electrophoresis (PAGE) and high pressure liquid chromatography (HPLC) of gliadins extracted from flours and bread crumbs of six high protein hard red winter wheats including two sister lines of varying breadmaking potential showed differences in their PAGE patterns. The PAGE bands of low mobility w-gliadins of bread crumb and high mobility alpha, beta, and gamma -gliadins of flour were more pronounced the general the change from flour to bread crumb was more pronounced between the good and the poor bread making flours. Similarly the gliadin HPLC elution patterns differed in different flours with little difference in parentlines. The changes were relatively small from flour to bread crumb in HPLC elution bands below 20 min, but consistently reduced in intensity beyond 20 min. The extent of reduction in peak intensity was much higher in good than in poor breadmaking quality flours. The heat labile and highly hydrophobic alpha, beta and gamma gliadins which are modified during baking are implicated for differences in breadmaking potential of wheat flours. AS

- 2115 Osborne (BG), Willis (KH) and Barrett (GM). Survival of bromate and bromide in bread baked from white flour containing potassium bromate. *Journal of the Science of Food and Agriculture* 42(3); 1988; 255-260

This study was undertaken to establish whether trace amounts of unchanged bromate survive breadmaking when used at permissible levels and secondly to account for all the added potassium bromate as the sum of potassium bromide (expressed as potassium bromate) and any residual potassium bromate. It was found that the amounts of potassium bromate surviving in bread made using the Chorley Wood Bread process were less than 0.06 mg kg^{-1} (the current limit of detection) when this substance was added to flour at levels up to 75 mg kg^{-1} on flour wt. even when the addition level reached 100 mg kg^{-1} only 0.22 mg kg^{-1} was found in the bread. Within the limits of experimental error all of the added potassium bromate not detected unchanged in the bread was accounted for in the form of bromide. NGKR

- 2116 Ranhotra (G) and Gelroth (J). Soluble and total dietary fiber in white bread. *Cereal Chemistry* 65(2); 1988; 155-156

On a 38% moisture basis, white breads made with 10 different flours contained 2.5 plus or minus 0.3% total dietary fiber (TDF), which included 1.0 plus or minus 0.2% soluble fiber. Bread ingredients contributed 2.0% TDF. Thus, TDF increased by 0.5% during breadmaking. Most of this was soluble fibre likely represented as resistant starch. AS

- 2117 Sosulski (FW) and Wu (KK). High-Fiber breads containing field pea hulls, wheat, corn, and wild oat brans. *Cereal Chemistry* 65(3); 1988; 186-191

Using a bakers' patent flour from hard red spring wheat, it was possible to formulate satisfactory high-fiber bread containing 20% corn bran, 15% field pea hulls, or 15% wild oat bran. The bread formulations for the straight dough method of breadmaking were optimized at 45 p.p.m. potassium bromide and 0.5% SSL (sodium stearoyl-2-lactylate) without any supplemental gluten. Prehydration of the fiber sources enhanced baking absorption and loaf characteristics. Total dietary fiber contents of the acceptable fiber breads were 21% for corn bran, 13% for wheat bran, 15% for pea hull, and 6% for wild oat bran breads. AS

Cakes

- 2118 Sych (J), Castaigne (F) and Lacroix (C). Effects of initial moisture content and storage relative humidity on textural changes of layer cakes during storage. *Journal of Food Science* 52(6); 1987; 1604-1610

This study was undertaken to study the relationship between cake moisture loss and the staling resulting on detrimental texture changes in the layer cakes during storage for 42 days at 20 °C water activity and moisture detn. were carried out. The estimations of cake firmness, adhesiveness, cohesiveness and elasticity using the Instron Universal Testing Machine and results showed that increased moisture

contents led to decrease the initial cake firmness but did not affect the final cake firmness. Storage at increased relative humidities did not decrease moisture but increased firmness and adhesiveness throughout the 42-day period of storage. NGKR

Crackers

- 2119 Ranhotra (G) and Gelroth (J). Soluble and insoluble fiber in soda crackers. *Cereal Chemistry* 65(2); 1988; 159-160

On a 4% moisture basis, soda crackers made with pastry flour contained 2.7 plus or minus 0.2% total dietary fiber(TDF), and those made with bread flour contained 3.7 plus or minus 0.4% TDF. About half of the TDF in crackers was soluble fiber. Although soluble fiber increased appreciably during cracker making, the increase in insoluble fiber was modest and observed only in crackers made with bread flour. Crackers made with pastry flour showed a decrease in insoluble fiber during cracker making. AS

Dough

- 2120 Hino (A), Takano (H), Kitabayashi (N), Nitta (F), Ohishi (T) and Tanaka (Y). Automatic measuring system for dough testing. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi') 35(5); 1988; 344-351 (Ja).

A new dough testing system was designed and constructed to measure automatically gas production in fermenting doughs. This system is in principle a manometer measured with rotary encoder, and a microcomputer controls data acquisition and analysis at suitable intervals. This instrument measures the amount of total gas produced with time and/or the amount of gas retained in the dough by evaluating the volume absorbed by an alkali solution of the gas escaped from the dough. The max. number of channel operated by the microcomputer is 48 and this channel to channel precision is below 2% or 0.2 ml. The microcomputer which is operated by a program written in BASIC provides the pattern of carbon dioxide production per 5 min and the point at which the dough starts to lose carbon dioxide. For this purpose, several data processing subroutines are involved in the program; the amount of total and part of gas at every 5 min, making graph and running average. As examples, some measurements were demonstrated. The pattern of gas production from sponge dough was similar to that of Zymotachygraph. Correlation coeff. were 0.91-0.98 between carbon dioxide production measured with this instrument and expansion of bread and sweet dough measured with the cylinder method. Coeff. of variation of the gas production between 12 channels were generally stable after 60 min. The performance and drawbacks of the present system are discussed. This instrument is now commercially available as Fermograph(ATTO Co., Ltd. JAPAN). AS

- 2121 Okada (K), Negishi (Y) and Nagao (S). Characterisation of acetic acid-soluble and insoluble proteins isolated from doughs mixed in the presence of N-ethyl maleimide. *Cereal Chemistry* 65(3); 1988; 248-252

Acetic acid soluble and insoluble proteins were isolated from doughs mixed in the presence of N-ethylmaleimide (NEMI). Reduced pyridylethylated acetic acid insoluble protein (AF) and soluble (BF) proteins were sequentially fractionated into different proteins including acetic acid insoluble fraction (F0), and acidic 70% ethanol-insoluble fraction (F-1). The AF and BF fractions differed in RP-HPLC and SDS-PAGE subunit patterns. The subunits of AF-0 eluted later by RP-HPLC than those of other fractions indicating higher surface hydrophobicities. Also S-succinyl-L-cysteine was present in high levels in peaks separated by RP-HPLC from AF-0. The breakdown of dough in the presence of NEMI is speculated to be due to the partial depolymerisation of glutenin and changes in protein surface hydrophobicities induced by modification of the key disulphide bonds by NEMI in fractions AF-0 and BF-1. The RP-HPLC, SDS-PAGE and amino acid analysis, showed that AF fraction contained different subunits than the BF fraction. AR

Noodles

- 2122 Chompreeda (P), Resurreccion (AVA), Hung (YC) and Beuchat (LR). Quality evaluation of peanut-supplemented chinese type noodles. *Journal of Food Science* 52(6); 1987; 1740-1741

The effect of supplementing Chinese type noodles with defatted groundnut flour along with physical, sensory and characteristics of cooked oven-dried and deep fried noodles have been investigated in these studies. These noodles were prepared from blends of Durum Wheat flour and partially defatted groundnut flour (10, 20 and 30%) and the above characteristics were evaluated. The results showed that lightness, cutting force of noodles were reduced with increase in ground nut flour but firmness number of chews before swallowing, yellowness and all other sensory scores were decreased. Replacement of upto 15% of wheat flour with groundnut flour resulted in noodles with acceptable sensory characteristics. However sensory qualities of cooked oven-dried (70 °C 2 h) noodles were higher than that of cooked deep fried (160 °C, 30 Sec) noodles. NGKR

- 2123 Toyama (R) and Sekizawa (N). Preservation of semi-dried Japanese noodle by addition of ethanol. Studies on preservation of semi-dried Japanese noodle. Part II. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi)' 34(9); 1987; 586-591 (Ja).

Effects of direct ethanol addition to raw ingredients on the preservation of semi-dried Japanese noodles and conditions for increasing the ethanol retention after drying were studied. (1) Ethanol in Japanese noodle was evaporated rapidly almost immediately after drying, however, the rate of ethanol evaporation was soon slowed down when moisture content came close to 30% of Udon. (2) Increase of viable cell counts was observed in ethanol non-added control samples of over 17 - 18% moisture content, however, the samples added 3 - 5% of ethanol did not show any increase at higher moisture content by 2 - 4%. (3) The effect of ethanol addition on the preservation of semi-dried Japanese noodle was ascribed to not only the lowering of water

activity of the sample, but also to the bacteriostatic and fungistatic effects of ethanol under lower water activity conditions. (4) Ethanol content of semi-dried Japanese noodle was successfully maintained at relatively high level under the drying condition of low temp. (20 °C) and humidity (65% R.H.). (5) Retention of ethanol in semi-dried Japanese noodle was successfully improved by addition of sucrose or dextrin. On the other hand, the lowering of sodium chloride content of semi-dried Japanese noodle enhanced this effect. AS

Tortilla

- 2124 Sanchez-Marroquin (A), Feria-Morales (A), Maya (S) and Ramos-Moreno (V). Processing, nutritional quality and sensory evaluation of amaranth enriched corn tortilla. *Journal of Food Science* 52(6); 1987; 1611-1614

Whole flour air classification protein and starchy fractions of raw amaranth seeds were employed in mixtures with commercial lime-treated corn flour (Minsa) or corn meal, as in traditional method, to prepare tortillas. Protein efficiency (PER) and net protein rate (NPR), were improved with no changes in the sensory characteristics. Lysine content decreased slightly in the processed samples. Improvement in the tortilla's protein (9.2 to 12%), fat (1.8 to 4.9%), phosphorus (231-370 mg%), and linoleic acid (41-56.8%) content was achieved. Each substituted flour demonstrated a unique sensory pattern, and amaranth flour and fractions showed no significant differences in the substitutions, tested principally for appearance, aroma, texture, flavour and aftertaste. AS

MILK AND DAIRY PRODUCTS

- 2125 Fuhrmann (J). About the application of the reflection spectroscopy in the near infra-red range in dairy (II). *Lebensmittelindustrie* 34(5); 1987; 221-223
- 2126 Tunick (MH). Calcium in dairy products. *Journal of Dairy Science* 70(11); 1987; 2429-2438

This review deals with the body's needs for calcium, how the body obtains and the role of the dairy products in supplying it. MVG

Milk

- 2127 Kinsella (JE). Physical properties of food and milk components: Research needs to expand uses. *Journal of Dairy Science* 70(11); 1987; 2419-2428
- 2128 Mahoney (RR) and Wilder (T). Enhanced thermostability of lactase (*Escherichia coli*) in milk. *Journal of Food Science* 52(6); 1987; 1730-1731

Denaturation of lactase in phosphate buffer was a first-order

process with a half-life of 1.12 min at 60 °C. Denaturation in milk was a biphasic first-order process with a half-life of 115 min at 60 °C. Electrophoresis, isoelectric focusing and kinetic analysis all indicated the presence of two isozymes. The minor isozyme exhibited 9% of the total activity and was less thermostable in milk than the major isozyme. In the temp. range 53.5-60 °C, the rate of denaturation of the major isozyme in milk was more than 100 times less than the rate in buffer. Arrhenius plots of denaturation in milk and buffer were biphasic. Above 56 °C, E_a denaturation in milk and buffer was 187 Kcal/mole and 19.8 kcal/mole, resp. below 56 °C E_a denaturation in milk and buffer was 36.8 kcal/mole and 158 Kcal/mole, resp. AS

- 2129 Mistry (VV), Kosikowski (FV) and Bellamy (WD). Improvement of lactic acid production in ultrafiltered milk by the addition of nutrients. *Journal of Dairy Science* 70(11); 1987; 2220-2225

The effect of nutrient addition to 2.1 ultrafiltered milk on lactic acid production by mesophilic lactic acid bacteria was assessed. MVC

Milk products

Cheese

- 2130 Joosten (HMLJ). The biogenic amine contents of Dutch cheese and their toxicology significance. *Netherlands Milk and Dairy Journal* 42(1); 1988; 25-42

Consumption of food containing biogenic amines does not lead to intoxication because amine destroying enzymes in the digestive tract prevent the uptake of these potentially hazardous compounds in the blood stream. As much as 1 mmol histamine and 3 mmol tyramine can be consumed without noticeable effects. However, when amine degradation is impaired, smaller quantities may cause food poisoning. Histamine destroying enzymes for example can be inhibited by concomitant ingestion of putrescine and cadaverine. It seems likely that such potentiation of histamine toxicity is involved in many cases of food poisoning. Relatively low biogenic amine contents were found in the cheeses made from pasteurised milk even though they contained large number of lactobacilli. In cheese made from raw milk, biogenic amines were more often detected. Especially in mature cheese made from raw milk, the quantities detected were relatively high. Cheese of good bacteriological quality contained smaller amounts than cheese infected with many non-starter bacteria. MCV

- 2131 Nooitgedagt (AJ) and Hartog (BJ). A survey of the microbiological quality of Brie and Camembert cheese. *Netherlands Milk and Dairy Journal* 42(1); 1988; 57-72

Approximately 90 cheeses comprising of Brie and Camembert (surface mold-ripened soft cheese) from the retail trade were examined for their microbiological quality, following a large outbreak of

gastro-enteritis in the Netherlands due to enterotoxigenic *E. coli* (ETEC). The numbers of *E. coli* exceeded 10^5 cfu/g in 4-5% of the samples and 13 and 18% of the Brie and Camembert samples, resp. contained $> 10^7$ cfu enterobacteriaceae per gram in their exterior portions. *Salmonella* was not detected, whereas *Yersinia enterocolitica* could be isolated from 3 samples. Rind samples of 3 Camembert cheeses contained $> 10^4$ cfu *S. aureus* /g; *B. cereus* in numbers $> 10^4$ cfu/g was present in core samples of 1 Brie and 1 Camembert cheese. High enterobacteriaceae and *E. coli* numbers as contaminants emphasise the following measures, (i) Adequate pasteurisation of milk used for products, (ii) Implementation of good manufacture and distribution practice, (iii) Judicious use of microbiological criteria, absence of pathogens, whereby *E. coli*, *S. aureus* and *B. cereus*, should not be recovered in members exceeding 10^4 cfu/g and *Salmonella*, *Shigella* and *Listeria monocytogenes* should be absent in 25 g. and (iv) Rapid and adequate methods to detect ETEC in stools and food samples to be developed using DNA-probe technique. MCV

- 2132 Verma (HS), Yadav (JS) and Neelakantan (S). Inhibitory effect of different preservatives on the growth of fungi isolated from cheese and butter. Indian Journal of Microbiology 28(1-2); 1988; 60-65

The antifungal activity of natamycin (pimaricin) and nystatin (mycostatin) each at 100, 200, 500 and 1000 p.p.m. level tried separately and as also sorbic acid and potassium sorbate (0.5, 1.0 and 2.0%) (ii) benzoic acid and sodium benzoate (0.25, 0.5 and 1.0%), (iii) propionic acid (4.0, 6.0 and 10.0%) were studied against five fungal isolates from cheese, namely *Aspergillus terreus*, *Trichoderma harzianum*, *Penicillium janthinellum*, *Penicillium* sp. and *Saccharomyces* sp. using Well assay method. Results showed that the yeast was more resistant than molds and the response of individual cultures to different preservatives varied. Antibiotics showed better inhibitory effect than the chemicals. Natamycin showed max. effect at 1000 p.p.m. and propionic acid the least at 10% concn. The inhibitory effect of all the chemicals increased with the increase in their concn. The antibiotics were more effective at 7 °C than at 25 °C. KAR

Gouda cheese

- 2133 Joosten (HMLJ) and Van Boekel (MAJS). Conditions allowing the formation of biogenic amines in cheese. A study of the kinetics of histamine formation in an infected gouda cheese. Netherlands Milk and Dairy Journal 42(1); 1988; 3-24

Gouda cheese was made from milk inoculated with a histidine decarboxylating *Lactobacillus* strain (St 2A). During ripening, the density of this strain, its decarboxylase activity and the histidine and histamine concn. were measured. Within a month, St 2A reached its max. density of more than 10^8 cfu/g. Enzyme activity was of highest value after about 40 days of ripening. Free histidine was hardly detectable in the cheese, in the rind a little (0.6 m mol/kg) was found, while in the centre of the cheese it was virtually absent (< 0.03 m mol/g). Histamine contents increased gradually during ripening. In the middle, its concn. was higher than in the rind (5.8

against 3.8 m mol/kg after 13 1/2 months of ripening). A kinetic model is proposed for histamine formation in cheese and its validity is tested by comparing experimentally determined histamine and histidine concn with those calculated with the model. The results of the calculations corresponded well with experimentally determined values. The results of calculations with this model make it likely, that histamine degradation does not occur in cheese and that the precursor concn is rate-determining for histamine formation in the infected cheese (10^5 cfu/g). In a regular Gouda cheese with a max. density of 10^6 cfu/g, only 0.5 m mol/kg of histamine will be formed after one yr of ripening. MCV

Manchego cheese

- 2134 Gaya (P), Medina (M), Bautista (L) and Nunez (M). Influence of lactic starter inoculation curd, heating and ripening temperature on *Staphylococcus aureus* behaviours in Manchego cheese. *International Journal of Food Microbiology* 6(3); 1988; 249-257

Growth and survival of *Staphylococcus aureus* were investigated in 52 lots of raw ewe's milk Manchego cheese manufactured and ripened under different conditions. A 5.8-fold reduction in *S. aureus* counts after 60 days of ripening was obtained by inoculating milk with 1% *Streptococcus lactis* culture, and a further 2.0-fold reduction could be achieved by adding 0.1% *Lactobacillus plantarum* culture. Curd heating temp. had a significant effect on *S. aureus* survival, with counts 4-5 times lower in cheese from 30 C curd than in cheese from curd heated at 36-40 C. Ripening temp. was the parameter with the greatest influence on *S. aureus* counts, which reached in cheese cured at 10 or 20 C for 60 days levels 10 and 100 times lower, resp. than in cheese held at 5 C. AS

Ice cream

- 2135 Goff (HD). Hazard analysis and critical control point identification in ice cream plants. *Dairy and Food Sanitation* 8(3); 1988; 131-135

In this review an attempt has been made to identify some of the hazards associated with post pasteurization contamination in an ice cream plant with some of their respective controls. Several pathogenic organisms such as *Salmonella* sp., *Listeria monocytogenes*, *Campylobacter* sp., and *Yersinia* sp. can survive in ice cream after contamination. The review covers following aspects-(a) Identification of hazards and critical control points, (1) Process variables (plant flow diagram, raw receiving, ingredients, pasteurization freezing and packaging) (2) Environmental variables (plant environment, sanitation and cleaning, personnel) (b) Critical control monitoring (c) Product retrieval/recall. 9 reference. CTD

Whey

- 2136 Desrosiers (T), Bergeron (G) and Savoie (L). Effect of heat treatments in in vitro digestibility of delactosed whey protein as determined by the digestion cell technique. *Journal of Food Science* 52(6); 1987;

1525-1528

Diafiltered whey protein conc. (WPC) were heated, in liquid form, under various conditions of time and temp. Protein and amino acid digestibilities were determined by in vitro pepsin and pancreatin digestion with continuous dialysis. Whey nitrogen digestibility decreased ($P < 0.05$) after heating at 121 C for 5000 sec. Heating WPC for 5000 sec at temp. below 121 C increased the digestibility of all amino acids except alanine and lysine at 75 C, and methionine and lysine at 100 C. In general, the longer was the heating period at 100 C or 121 C, the lower was the amino acid digestibility. These results emphasized the importance of structural modifications brought about by heat treatments on protein digestibility. AS

- 2137 Mangino (ME), Liao (YY), Harper (NJ), Morr (CV) and Zadow (JG). Effects of heat processing on the functionality of whey protein concentrates. Journal of Food Science 52(6); 1987; 1522-1524

In this investigation the effect of heating on the functionality and composition of whey protein conc., has been studied. Eight combinations of heat treatment during the processing of WPC from milk, whey and retentate were utilised for this study and results showed that pasteurisation of the milk had a positive effect on overrun and stability but had a negative effect on gel strength at pH 6.5, protein hydrophobicity and natural lipid content. Pasteurisation of the whey resulted in decreased mineral content but did not affect functionality whereas pasteurisation of the retentate caused a decrease in emulsion capacity, soluble Beta-lactoglobulin solubility whipped topping overrun and gel strength at pH 8.0. NGKR

MEAT AND POULTRY

Meat

- 2138 Gill (CO). The solubility of carbon dioxide in meat. Meat Science 22(1); 1988; 65-71

The solubility of carbon dioxide in muscle tissue of pH 5.5 at 0 C was approx. 960 ml at STP/kg of tissue. The solubility increased with increasing tissue pH by 360 ml/kg for each pH unit. The solubility decreased with increasing temp. by 19 ml/kg for each C rise. Solubilities in beef, pork and lamb muscle tissue were comparable. The solubility of carbon dioxide in fat tissues initially increased as the temp. was raised above 0 C, but then declined at higher temp. with the temp. of peak solubility and the solubility curves being markedly different for fat tissue from the three species. AS

- 2139 Scott Smith (J) and Burge (DLJr). Protoporphyrin-IX as a substitute for nitrite in cured-meat colour production. Journal of Food Science 52(6); 1987; 1728-1729

The use of the iron-free heme derivative protoporphyrin -IX as a

possible meat colorant has been investigated in this paper. This compound was added to a cooked emulsified beef product to minimise the typical cured-colour obtained with nitrite. Although the pigment was stable and could be recovered from the emulsion it imparted a purple hue as noted by visual observation and Hunter colour values (L, a, b). NGKR

Beef

- 2140 Beilken (SL) and Harris (PV). A comparison of isometric tension and differential scanning calorimetry measurements on meat. *Journal of Food Science* 52(6); 1987; 1455-1460, 1499

In this investigation binding studies were conducted at pH 7.0 of modelmelanoidins like coffee and toasted bread which contain brown pigments formed by non enzymatic browning reactions of amino acids with reducing sugars and glyoxal.

- 2141 Emswiler-Rose (B), Bennett (B) and Okrend (A). comparison of cultural methods and the DNA hybridization test for detection of *Salmonellae* in ground beef. *Journal of Food Science* 52(6); 1987; 1726-1727

This study was undertaken to evaluate different methods used for detection of *Salmonellae* in ground beef with DNA hybridization test for detection of *Salmonellae* in naturally contaminated dairy cow ground beef. All samples which were *Salmonellae* positive by cultural methods were also positive by DNA H only a few samples (3.7%) gave false positive test but no false negative results were reported. Hence the DNA H test seemed to be a reliable method for *Salmonellae* detection in ground beef. NGKR

- 2142 Gill (CO) and Penney (N). The effect of the initial gas volume to meat weight ratio on the storage life of chilled beef packaged under carbon dioxide. *Meat Science* 22(1); 1988; 53-63

Normal pH (5.5-5.7) and high pH (> 6.0) beef cuts of 400 g were vacuum packaged in polyvinylidene chloride (PVDC) laminate, in aluminium foil laminate or in foil laminate with a carbon dioxide scavenger (Ba(OH)_2); or were packaged under carbon dioxide in foil laminate with carbon dioxide added at 200, 400, 700, 1000 or 2000 ml/kg of meat. The process used to prepare meat before packaging resulted in an initial flora containing a high fraction of enterobacteria but with undetectable numbers of lactobacilli. During storage at +1 C all vacuum packaged meat developed floras containing substantial fractions of enterobacteria. The enterobacteria fractions were larger on high pH than on normal pH meat, and on normal pH meat in PVDC or in foil laminate plus carbon dioxide scavenger packs than on normal pH meat in foil laminate without the carbon dioxide scavenger. All vacuum packaged meat was spoiled by putrid flavours, high pH meat at 7 wk. and normal pH meat at 12 wk. Increasing amounts of added carbon dioxide progressively retarded the development of putrid spoilage as growth of the spoilage floras was slowed while the relative numbers of lactobacilli in the floras were enhanced. With the two largest amounts of added carbon dioxide spoilage was delayed until 15 wks and 21 wks for

high pH meat and normal pH meat, resp. and enterobacteria were detected in the spoilage floras only at later sampling times. With lesser amounts of added carbon dioxide enterobacteria persisted or re-emerged at earlier times, in the floras. AS

- 2143 Park (WS) and Addis (PB). Cholesterol oxidation products in some muscle foods. *Journal of Food Science* 52(6); 1987; 1500-1503

These studies have been carried out to determine the cholesterol oxidation products in some common meat products such as beef steaks, precooked beef and ground meat products using GC method. The possible links between rancidity development and cholesterol oxidation were also studied. The results indicated that beef whether freshly cooked or precooked and refrigerated for several days represents a very minor contributor of COPS (Cholesterol oxidation products) in the diet of humans. COPS in cooked turkey samples were low but somewhat higher than beef. NGKR

- 2144 Recio (HA), Savell (JW), Branson (RE), Cross (HR) and Smith (GC). Consumer ratings of restructured beef steaks manufactured to contain different residual contents of connective tissue. *Journal of Food Science* 52(6); 1987; 1461-1463, 1470

Restructured beef steaks were evaluated by consumers (n = 90 house holds) in Houston, TX. Consumers were selected to assure that demographic representation-age, ethnic background, income, education- was accomplished. Restructured beef steaks were manufactured from 27 beef shoulder clods (nine per treatment) that were subjected to different degrees of connective tissue removal-no trim (NT), intermediate trim (IT) and extensive trim (ET). Consumers rated ET steaks highest, IT steaks intermediate, and NT steaks lowest for overall desirability with significant differences found among the treatments. Consumers perceived this product as being intermediate in monetary value when compared to ground beef and T-bone steak. AS

- 2145 Zamora (MC) and Zaritzky (NE). Antimicrobial activity of undissociated sorbic acid in vacuum packaged beef. *Journal of Food Science* 52(6); 1987; 1449-1454

In this study the antimicrobial activity of the dissociated and undissociated forms of sorbic acid as a function of pH in vacuum packaged refrigerated beef has been determined. A mathematical model of bacterial growth by means of equations that consider the effect of sorbic acid concn on lag phase, growth rate and time necessary to reach the stationary phase has also been developed. The modification of bacterial growth parameters like total counts, *Lactobacillus* sp., *Pseudomonas* sp., *Enterobacteriaceae*, *Brochothrix thermosphacta* and yeasts in samples of different pH values (5.70-6.20) which has been treated with potassium sorbate (27-3125 p.p.m.) showed variations in the lag phase, growth rate, stationary phase and inhibition index. It has also been shown that for refrigerated beef the contribution of sorbic acid dissociated fraction to the inhibitory effect was found to be negligible. NGKR

Bovines

- 2146 Bandman (E) and Zdanis (D). An immunological method to assess protein degradation in post-mortem muscle. *Meat Science* 22(1); 1988; 1-19

A method for determining proteolysis of any specific protein in muscle is demonstrated. The protocol involves the preparation of a specific antibody which is used in immunoblotting total protein extracts from post-mortem muscle. In the present study an antibody to bovine myosin heavy chain was prepared that reacts with intact myosin heavy chain as well as proteolytic fragments that are generated by proteases. We show that little if any, myosin heavy chain fragments are generated during prolonged aging of muscle at 4 °C. In contrast, storage of muscle at 37 °C results in the rapid breakdown of myosin heavy chain to immunologically detectable peptides. Using a monoclonal antibody to titin, we demonstrate that this protein is degraded at 4 °C during the aging period, and that, between 2 and 3 wks following slaughter, no undegraded titin is detectable. This method is suitable for the analysis of any protein that can be separated by SDS polyacrylamide gel electrophoresis. (SDS-PAGE). AS

Meat products

- 2147 Schulz (E), Jensen (B) and Celerynova (E). Automated turbidimetry for rapid determination of the bacteriological quality of raw meat and processed meat products. *International Journal of Food Microbiology* 6(3); 1988; 219-227

A fully automated centrifugal spectrophotometer for turbidimetric measurements linked to a computer for data processing was used to record and analyze growth of different types of bacteria associated with spoilage of raw meat and processed meat products (sliced meat for sandwiches) in order to predict bacterial counts. Media for this specific analysis were developed to enumerate total viable count, lactic acid bacteria, *Brochothrix thermosphacta* and *Pseudomonas* spp. Correlation coeff. of -0.91 to -0.97 were obtained between the conventional plate count technique and the turbidimetric method (linear regression). Lactic acid bacteria in the range 10^3 to 10^7 cfu/g could be detected within 48 h, whereas total viable count, *Brochothrix thermosphacta* and *Pseudomonas* spp. generally could be detected within 24 h. Counts exceeding 10^7 cfu/g could be detected within 6 h. AS

Mutton

Sheep

Lamb

- 2148 Renerre (M) and Dantchev (S). Influence of electrical stimulation and carcass chilling mode on lamb meat colour stability. *Sciences des Aliments* 7(4); 1987; 535-548

Pork

- 2149 Ehioba (RM), Kraft (AA), Molins (RA), Walker (HW), Olson (DG), Subbaraman (G) and Skowronski (RP). Effect of low-dose (100 krad) gamma radiation on the microflora of vacuum-packaged ground pork with and without added sodium phosphates. *Journal of Food Science* 52(6); 1987; 1477-1480, 1505

This work was undertaken to determine the potential use of low dose irradiation (100 krad) to prolong the shelf life of vacuum packaged ground pork. Also the advantages of adding 0.4% selected phosphates to fresh, ground pork before vacuum packing and irradiation processing have been studied. The results showed that numbers of naturally occurring mesophiles, psychotrophs and anaerobes or facultative anaerobes were found to be reduced by irradiation without any effect on lactic acid bacteria. It was also seen that irradiation prolonged shelf life 2.5-3.5 days (30-44%) in inoculated and 1.0-1.5 days in inoculated (10^5 cfu/g) meat whereas by addition of SAPP (sodium acid pyrophosphate) (0.4%) two additional days to inoculated irradiated porks shelf life without any effect on the naturally occurring microflora was noticed. There was also no increase in lipid oxidation due to irradiation and not affected by phosphates. NGKR

- 2150 Kim (C), Carpenter (CE), Cornforth (DP), Mettananant (O) and Mahoney (AW). Effect of iron form, temperature, and inoculation with *Clostridium botulinum* spores on residual nitrite in meat and model systems. *Journal of Food Science* 52(6); 1987; 1464-1470
- 2151 Molins (RA), Kraft (AA) and Olson (DG). Insolubilization of orthophosphates in fresh or cooked ground pork. *Journal of Food Science* 52(6); 1987; 1486-1489

In this paper the extent of possible orthophosphate absorption by cooked and uncooked ground pork in order to ascertain whether the soluble orthophosphate content of pork is a good indicator of residual pyrophosphate added to fresh pork meat has been investigated. The results showed that cooking ground pork to 65.5 °C resulted in an immediate decrease in soluble orthophosphate compared with the corresponding values in fresh pork and cooking the meat caused additional insolubilisation of added orthophosphate and also of natural meat orthophosphate. Therefore soluble orthophosphate measurements could not be used to estimate the preparation of added pyrophosphate that was hydrolysed in the meat or by difference the preparation of residual unhydrolysed sodium acid pyrophosphate. NGKR

Porcine

- 2152 McCormick (RJ), Kropf (DH), Reeck (GR), Hunt (MC) and Kastner (CL). Effect of heating temperature and muscle type on porcine muscle extracts as determined by reverse phase high performance liquid chromatography. *Journal of Food Science* 52(6); 1987; 1481-1485

Meat products

Frankfurters

- 53 Woychik (JH), Happich (MC), Trinh (H) and Seilers (R). Quantitation of soy protein in frankfurters by gel electrophoresis. *Journal of Food Science* 52(6); 1987; 1532-1534

The results of application of a Laemmli SDS-PAGE procedure as modified by Basch et al for estimation of soy protein isolate in a variety of commercial and prepared meat products have been presented in this paper. Height and area ratios of selected soy and beef components were calculated from densitometric scans and compared with similar ratios calculated for soy and beef mixtures of known composition using this method which permitted the estimation of soy protein in raw and pasteurised frankfurters and will also be applicable to other selected soy containing meat products. NGKR

Ham

- 154 Karrer (JA), Kemp (JD), Langlois (BE) and Fox (JD). Microbial and sensory quality of boneless dry-cured hams as affected by mechanical pressing and potassium sorbate. *Journal of Food Science* 52(6); 1987; 1471-1476

In this investigation the effects of mechanical pressing and a 10% potassium sorbate dip on microbial and organoleptic properties of boneless dry-cured hams were studied. The results revealed that pressing resulted in higher nitrite levels, higher cooking losses and lower Warner Bratzler shear values but did not affect yields, final microbial counts or sensory characteristics whereas potassium sorbate treatment improved visual mold scores and generally reduced surface aerobic yeast and mould and staphylococci counts with several reductions which are statistically significant at 0.01 or 0.05 levels. This also reduced saltiness and flavour intensity scores but no effect was seen in other cooking and sensory characteristics of the products. NGKR

Patties

- 155 Park (S), Novakofshi (J), Bechtel (PJ) and McKeith (FK). Palatability and texture of ground meat patties made with varying amounts of pork and turkey. *Journal of Food Science* 52(6); 1987; 1490-1494

In this study the subjective and objective quality characteristics of ground meat products made with different blends of pork and turkey thigh meat but containing similar amounts of fat have been evaluated. Also, the effect of adding a commercial seasoning blend containing antioxidants was also evaluated. The effects of storage temp. and storage time on the quality characteristics of mixed pork and turkey thigh meat products were also determined. The results showed that off-flavour and firmness scores were not affected by blend for products containing between 33% and 100% pork lean whereas storage

had no effect on off-flavor in products containing seasoning antioxidant mixture. Juiciness was also not effected by blend or storage and this indicated patties can be made from blends of pork and turkey containing high levels of turkey. NGKR

Poultry

Chickens

- 156 Thind (SS), Bawa (AS) and Sekhon (KS). Partial replacement of chicken meat with giblets in the preparation of patties. Poultry Guide 25(8); 1988; 46-48, 73-75

In chicken meat patties, chicken meat was replaced by giblets at 10, 20, 30, 40 and 50% levels. Binder (semolina) at 10% level and fat at 12.5% level was added to patties containing 30, 40 and 50% of giblets to improve texture and acceptability. The patties were served to panelists after cooking at 130 C for 40 min. The patties were also stored for 60 days and evaluated at intervals of 2 wk. The cooking loss decreased with increase in storage period at all levels of giblet replacement; at 30% replacement cooking loss was max. (18.8%) at 60 days of storage. A decrease in shrinkage of size is also observed during the storage period. At 10% level of binder the cooking loss increased with increase in giblet incorporation from 30% (21.86) to 50% (23.08) while the shrinkage decreased from 11.20% to 10.56% similar result was also observed in stored patties as well. Shear values decreased with increase in length of storage as well as level of giblet replacement. Although addition of binder improved the binding and shear value, but this improvement was negligible for 50% replacement samples. Addition of 10% binder reduced the protein content. Organoleptic scores indicated that patties containing up to 30% of giblet were acceptable even after 60 days of storage. Increased level of binder improved the overall acceptability over the normal level; but after 60 days storage the acceptability was almost same. Highly perceptible liver flavour was noted in patties containing 40 and 50% giblets. KAR

Turkeys

- 15 Foegeding (EA). Functional properties of turkey salt-soluble proteins. Journal of Food Science 52(6); 1987; 1495-1499

The functional properties of salt-soluble proteins (SSP) extracted from turkey breast and thigh were determined. Breast and thigh SSP extracts were comprised of similar proteins and there was no difference in the effect of pH and NaCl concn on solubility. Gels formed in a pH 6.0, 0.5M NaCl phosphate buffer were stable to centrifugation and had the greatest rigidity. Gels formed at pH 7.0 with breast SSP were stable to centrifugation, whereas pH 7.0 thigh SSP gels were not consistently stable. Uniaxial compression was used to determine failure shear stress, failure shear strain and hardness of gels. Breast SSP at 25 mg/ml and 35 mg/ml formed gels suitable for compression analysis, whereas thigh SSP gels of similar concn were too frail for analysis. Breast SSP had more favorable gelation properties than

thigh SSP. AS

SEAFOODS

- 2158 Xia (B) and Abott (IA). Edible seaweeds of China and their place in the Chinese diet. *Economic Botany* 41(3); 1987; 341-353

Coastal peoples of China are consumers of seaweeds, which rank as favored "vegetables" and are introduced into several kinds of cooking methods in the same way that Westerners might use onions (raw, fried, steamed, boiled, used alone, or mixed with other vegetables). Description for preparation of 24 species are provided; a table gives the names of all species known to be used as food in China at this time. Although thousands of workers are involved in growing the seaweed crops of the brown alga, *Laminaria* and the red alga *Porphyra*, many thousands more become part of the total activity of gathering the 74 species in 36 genera that form an important part of the Chinese diet. These numbers of species of edible algae are larger than those reported for any ethnic group in the world. This report is the first comprehensive one to appear in the West on seaweeds as food in China. AS

Fish

- 2159 Jagadees (K). Role and importance of peeling sheds in fish processing/exporting industry. *Seafood Export Journal* 20(1); 1988; 9, 11-13, 15, 17-18

The general article covers aspects of indigenous peeling sheds including their importance, survey results, subsidy scheme and maintenance grants, upgradation of existing peeling sheds, working of immunity peeling centres, extrusion education and practical training for peeling workers, and suggestions for improvement. KAR

- 2160 Nomoto (M) and Ohno (T). Evaluation of a freshness sensor and its application for estimating the K value of fish meat being put in market. *Journal of Japanese Society of Food Science and Technology* ('*Nippon Shokuhin Kogyo Gakkaishi*') 34(9); 1987; 598-602 (Ja).

It is reported that freshness of fish meat can be expressed by the K value according to the following calculation: $K \text{ value } (\%) = (HxR + Hx) \times 100 / (ATP + ADP + AMP + IMP + HxR + Hx)$. A freshness analyzer, a kind of biosensor, was recently manufactured by the Oriental Electric Co., Niiza-shi. We examined the availability of this sensor and confirmed that the K value was obtained with a sufficient accuracy for practical application, within several minutes. Using this sensor, we determined the K values of fishes being put in the market. The samples used were horse mackerel (*Trachurus japonicus*), sardine (*Sardinia melanosticta*), saury pike (*Cololabis saira*) and Pacific herring (*Clupea pallasii*) purchased from a department store (A), supermarkets (B, C, D) and private retail stores (E, F). The K values of the samples increased up to 50% within several hours at 13-16°C and within 4

days at 3-5 C. resp. but not at -80 C. The K values of the samples were diversified at every fish, every store, and every date of purchasing. It looks very hard to find the type of store where we can get the best goods. If the freshness of fishes were indicated by the K value labelled on package, it would be very convenient for the customers in choosing the fresh goods at store. AS

- 2161 Park (JW) and Lanier (TC). Combined effects of phosphates and sugar or polyol on protein stabilization of fish myofibrils. *Journal of Food Science* 52(6); 1987; 1509-1513

Stabilization of fish myofibrils was investigated with respect to freeze and heat-induced denaturation as affected by the addition of phosphates (0.25, 0.5% of sodium tripolyphosphate or neutralized pyrophosphate), alone or in combination with 8% Polydextrose or a sucrose/sorbitol mixture. Freeze-induced aggregation was reduced effectively by combination of phosphates and carbohydrates, and, less effectively, by phosphates or carbohydrate alone. The most effective treatment consisted of 0.5% of either phosphate treatment combined with either carbohydrate treatment. Differential scanning calorimetric studies revealed that phosphate addition induced stabilization of myosin and carbohydrate addition generally induced a one-step denaturation process for myosin. No differences due to phosphate type were observed in any measured parameter. AS

- 2162 Rasco (BA), Downey (SE), Dong (FM) and Ostrander (J). Consumer acceptability and color of deep-fried fish coated with wheat or corn distillers' dried grains with solubles (DDGS). *Journal of Food Science* 52(6); 1987; 1506-1508

Distillers' dried grains with solubles (DDGS) from hard red wheat, soft white wheat and corn were used at a substitution level of 25% by wt. for all-purpose flour in a conventional batter mix for fried fish. Fried fish nuggets (Alaskan pollock) prepared with a 25% DDGS batter either with or without a Japanese-style Panko breading were evaluated by a consumer panel (N = 2,546) for acceptability. All experimental products were rated as acceptable. There were no significant differences among the ratings of the products coated with batter only. However, products coated with batter and then with Panko breading were rated differently: the corn DDGS coated sample was rated higher than the control, while the white and red wheat DDGS coated samples received the lowest ratings. International color measurements of the dry batter mixes and the fried fish nuggets containing DDGS were darker than the controls. AS

Carp

- 2163 Runge (G), Steinhart (H), Schwarz (FJ) and Kirchgessner (M). Influence of different fats with varying additions of Alpha-tocopherol acetate on the fatty acid composition of carp (*Cyprinus carpio* L.). *FAT Science and Technology* 89(10); 1987; 389-393

Crawfish

- 2164 Marshall (GA), Moody (MW), Hackney (CR) and Godber (JS). Effect of blanch time on the development of mushiness in ice-stored crawfish meat packed with adhering hepatopaneas. *Journal of Food Science* 52(6); 1987; 1504-1505

This study was undertaken to evaluate the effect of blanch time on the texture of ice stored crawfish meat packed with adhering hepatopaneas and the use of gelatin degradation as a simple in-plant test for adequacy of blanch process. This study showed that under cooking of whole crawfish can result in mushiness of peeled meat packed with adhering hepatopaneas and that gelatin degradation could be used by processors to conduct a simple in-plant test of the adequacy of their heat process. NGKR

Plaice

- 2165 Iwamoto (M), Yamanaka (H), Watabe (S) and Hashimoto (K). Effect of storage temperature on rigor-mortis and ATP degradation in Plaice (*Paralichthys olivaceus*) muscle. *Journal of Food Science* 52(6); 1987; 1514-1517

Live specimens of the plaice *Paralichthys olivaceus* were spiked at the brain, stored at various temp. ranging from 0 C to 20 C and examined for changes in rigor tension and ATP degradation in the muscle. The ATP degradation rate was clearly slower at 5-15 C than at 0 C, resulting in retardation of rigor-mortis onset at the former temp. lactic acid accumulation in the muscle correlated well with the decrease of ATP. The muscle showed an ATP concn of 3 μ mol/g and "rigor index" (full rigor = 100%) at 30% when lactic acid increased up to 30 μ mol/g at most storage temp. The muscle showed full rigor when ATP completely disappeared and lactic acid attained the maximum plateau (40-50 μ mol/g). AS

Shrimps

- 2166 Fatima (R), Khan (MA) and Qadri (RB). Shelf life of shrimp (*Penaeus merguensis*) stored in ice (0 C) and partially frozen (-3 C) *Journal of the Science of Food and Agriculture* 42(3); 1988; 235-247

In this study the effect of sub-zero storage on the shelf life of shrimp (*Penaeus merguensis*) by sensory biochemical and microbiological changes and changes in sodium dodecyl sulphate polyacrylamide gel electrophoresis (SDS-PAGE) patterns of myofibrillar and sarcoplasmic proteins were studied during storage at -3 C; PFS (partial freezing storage) and in ice (0 C; IS). The results showed that during PFS upto 20 days there were slight changes in biochemical parameters, apparently no changes in microbiological populations and no changes in electrophoretic protein patterns. Rapid changes in these parameters occurred in IS over the same period. It is also seen that sensory quality of shrimps stored at PFS increased at this temp. as compared to IS. The shelf life at PFS was 16 days as compared to 8 days in IS, this being attributed to the slower rate of changes at PFS compared to IS and these changes are associated with chemical properties. NGKR

PROTEIN FOODS

Infant foods

- 2167 Heppell (LMJ), Sissons (JW) and Pedersen (HE). A comparison of the antigenicity of soya-bean-based infant formulas. *British Journal of Nutrition* 58(3); 1987; 393-403

Four soybean-based infant formulas studied, showed considerable differences in antigenicity. In vivo studies with guinea pigs, rabbits and calves were in good agreement and broad correlated with immunochemical assessment of antigenicity. However, in vitro and in vivo results did not correspond exactly and levels of glycinin and Beta conglycinin below the limit of detection by enzyme linked immunoabsorbent assay (ELISA) could evoke an immune response in different animal species. These variations in antigenicity of different commercial soy-based products could be important when interpreting the results of studies of the development of allergy in infants given soy-based formulas. MVG

- 2168 Roman (AV), Bender (AE) and Morton (ID). Storage stability of an infant food based on rice, cowpeas and skim milk powder. *Human Nutrition: Food Sciences and Nutrition* 41F(1); 1987; 23-28

Samples of a roller-dried mixture of rice, cowpeas, and skim milk powder containing 5 or 7% moisture were stored in sealed cans and 25 and 37 °C. Samples sealed under nitrogen and stored at -20 °C served as controls. The powders were examined after two, four and six months' storage. Moisture content and temp. of storage had a small but significant effect on the colour of the powders regardless of the length of storage. No major changes were registered in the viscosity of the reconstituted powders after storage for six months. Oxidative deterioration of the fat was higher at 37 °C as measured by hinisidine value and was larger in the product containing 5% moisture than the one containing 7% moisture but this could not be detected organoleptically. No changes in protein quality occurred during storage as measured by the chemically determined available methionine and cysteine and by biological assay on rats. AS

- 2169 Valencia (ME), Troncoso (R) and Higuera (I). Linear programming formulation and biological evaluation of chickpea-based infant foods. *Cereal Chemistry* 65(2); 1988; 101-104

Three chickpea-based infant food formulations were designed using a linear programming model to minimize total cost while meeting the FAO/WHO requirements for lysine and sulphur amino acids. Each formulation was prepared by cooking and blending the ingredients into a viscous paste that was later drum-dried and analyzed for chemical composition. Biological evaluation of protein quality by means of protein efficiency ratio, net protein ratio, and apparent protein digestibility was also performed. Results showed no significant protein efficiency ratio or net protein ratio differences between the

casein control and any of the experimental formulation tested. Although they were produced at min cost, all products complied with the infant food specifications established by the Codex Alimentarius Commission. AS

Weaning foods

- 2170 Roman (AV), Bender (AE) and Morton (ID). Formulation and processing of a weaning food based on rice, cowpeas and skim milk powder. *Human Nutrition: Food Sciences and Nutrition* 41F(1); 1987; 15-22

The use of rice (*Oryza* sp.) cowpeas (*Vigna unguiculata*) and skim milk powder was investigated in the formulation and processing of an infant food. In order to determine the best methods of preparing the mixture to ensure the destruction of trypsin inhibitors, preliminary trials were carried out with cowpeas alone. Forty per cent of the trypsin inhibitors was destroyed when the cowpeas were soaked, dehusked, ground and roller dried. Cooking before roller drying ensured destruction of 91% of the trypsin inhibitors. The cooked cowpeas were subsequently ground and a mixture of 30% cowpeas, 50% ground rice and 20% skim milk powder prepared. The solids content was adjusted to 25% with water. The slurry was dried on an atmospheric double roller dryer at two different rollers speeds to obtain products containing 5 and 7% moisture. Protein quality as measured by the chemically determined available methionine and cysteine and biological assay was not affected by the processing. AS

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

- 2171 Geier (U). Rational water consumption for cleaning and disinfection in the fermentation and beverage industry. *Lebensmittelindustrie* 34(5); 1987; 216-217

Alcoholic beverages

Wines

- 2172 Pages (J), Asselin (C), Morlat (R) and Robichet (J). Multiple factor analysis and its use in the sensory data processing. Application to red wines from the Loire valley. *Sciences des Aliments* 7(4); 1987; 549-571

Non-alcoholic beverages

Coffee

- 2173 Purdon (MP) and McCamey (DA). Use of a 5-caffeoylquinic acid/caffeine ratio to monitor the coffee roasting process. *Journal of Food Science* 52(6); 1987; 1680-1683

The use of HPLC for the rapid simultaneous detn. of the chlorogenic acid and caffeine in coffee has been presented in this paper.

An HPLC method was developed by which simultaneous quantification of 5-caffeoylquinic acid (Chlorogenic acid) and caffeine could be used for monitoring degree of roast by determining the ratios of these two parameters. NGKR

Fruit juices

Grapefruit juices

- 2174 McIntosh (CA), Mansell (RL) and Barros (S). Relationship between limonin concentration and naringin concentration in commercial single strength grapefruit juice. *Journal of Food Science* 52(6); 1987; 1734-1735

In this investigation the limonin and naringin content of commercial single strength grapefruit juice (*Citrus paradisi*) samples was measured by immunoassay. By linear regression analysis of variance results showed that there was no correlation between limonin and naringin concn. In order to determine the total bitterness potential of the product each of these two compounds would have to be determined. NGKR

- 2175 Nikdel (S), Rouseff (R) and Fisher (J). Comparative effects of three types of florisil treatments on flavanone glycosides and minerals of processed grapefruit juice. *Journal of Food Science* 52(6); 1987; 1673-1675

Orange juices

- 2176 Kacem (B), Cornell (JA), Marshall (MR), Shireman (RB) and Mathews (RF). Nonenzymatic browning in aseptically packaged orange drinks: Effect of ascorbic acid, amino acids and oxygen. *Journal of Food Science* 52(6); 1987; 1668-1672

The loss of ascorbic acid and development of browning as affected by ascorbic acid and amino acid content and the oxygen permeability of the packaging material have been determined in this investigation in single strength orange juice and synthetic orange drinks containing 10% (V/V) orange juice under aerobic and anaerobic conditions. The products were packed aseptically into two types of flexible film and stored at 24 C for 20 wks. It was seen that ascorbic acid retention was affected by the processing itself, the concn of added amino acids and by the packaging material. It was also found that the effect of amino acids on browning was found to be proportional to their concn. and was more effective with high levels of ascorbic acid. NGKR

- 2177 Kacem (B), Mattheews (RF), Crandall (PG) and Cornell (JA). Nonenzymatic browning in aseptically packaged orange juice and orange drinks. Effect of amino acids, deaeration, and anaerobic storage. *Journal of Food Science* 52(6); 1987; 1665-1667, 1672

In this investigation the factors responsible for the deterioration of aseptically packaged orange juice and orange drinks stored

under aerobic and anaerobic conditions have been studied along with the effects of three added amino acids and deaeration single strength orange juice and synthetic orange drinks having 10% (V/V) orange juice and 0.4 and 0.8% (W/W) concn of each amino acid: aspartic acid, arginine and 4-aminobutyric acid were aseptically packaged using 250 ml. Tetra Brik packs samples were stored at 24 °C for 16 wks. under aerobic and anaerobic conditions and were tested once in 4 wks for nonenzymatic browning, vitamin C retention, dehydroascorbic acid formation and organoleptic quality changes. It was seen that deaeration and anaerobic storage resulted in increased retention of vitamin C. However, very little changes occurred in colour, amino acid, browning, flavour quality of the different samples throughout the storage period. NGKR

FATS AND OILS

- 2178 Yamazaki (M). Fatty acid composition of animal fats and oils and its variation. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi)' 34(9); 1987; 616-624 (Ja)

Fats

- 2179 Laubli (MW), Bruttel (PA) and Schalch (E). Determination of the oxidative stability of fats and oils. Comparison between active oxygen method (ACM) and Rancimat method. *FAT Science and Technology* 90(2); 1988; 56-58

Rancimat method which is less time consuming found to be superior than the active oxygen method as the latter requires determination of peroxide number periodically. The induction time determined with the two methods for six different fats and oils showed a good correlation. N

- 2180 Momin (SA), Kale (DD) and Subramanyam (VVR). Rheological behaviour of butter-like products. *Journal of the Oil Technologists' Association of India* 19(3); 1987; 58-60

Fat bases were prepared from Vanaspathi (V) and refined cotton seed oil (CSO); interesterified fat base is made from a blend of V and CSO. For making butter-like spreads (BLS), glycerol monostearate (GMS) made from fully hydrogenated CSO was used. Slip point (SP) of BLS was higher than SP of fat base and the hardness of the latter is lower than BLS. Rheological properties of butter-like products, at a given temp. depend on the amount of crystallizable solids in the fat base, and also to some extent on the fat/water ratio when prepared under identical conditions. Increasing GMS, from 1.5 to 3% increases the crystallizable solids content at a given temp. which results in BLS of increased hardness and lower spreadability when the fat/salt-water ratio is 85:15 the BLS obtained is softer and has greater spreadability than those prepared with other ratios. Drop point and SP increase when the water content is increased or decreased from 15%; spreadability is more for 90:10 fat/salt-water ratio compared to 85:15

product while the lower ratios (80:20 and 75:25) give sticky BLS with the tendency of water separation. The flow characteristics of BLS determined at 30 °C and 33 °C indicated that it fits Casson model at low solids content. KAR

Fatty acids

- 181 Akoh (CC) and Swanson (BG). One-stage synthesis of raffinose fatty acid polyesters. *Journal of Food Science* 52(6); 1987; 1570-1576

Liquid polyesters of raffinose (raffinose polyester, RPE) were synthesized by a one-stage solvent-free interesterification of raffinose undecaacetate (RUAC) and fatty acid methyl esters (FAME) of salad oils, long chain fatty acids and blends thereof. Interesterification was essentially a low temp. low pressure process consisting of forming a homogenous melt of RUAC and FAME in the presence of an alkali metal catalyst (2% sodium). RPE were formed with 95.8-99.3% yield based on initial wt. of RUAC. Formation of RPE was evaluated with thin layer chromatography (TLC) and RPE composition determined by transesterification with 1.0M methanolic NaOH, followed by TLC and gas liquid chromatography (GLC). The structure of RPE was confirmed by both infrared (IR) and nuclear magnetic resonance (C-13 NMR) spectroscopy. Physical properties of the synthesized RPE were similar to physical properties of sucrose polyesters (SPE), conventional salad and vegetable oils. Synthesis of RPE catalyzed by sodium metal appeared to be a deacetylation-acylation process. AS

Salfat

- 182 Yella Reddy (S) and Prabhakar (JV). Effect of diglycerides on the solidification properties of sal (*Shorea robusta*) fat. *FAT Science and Technology* 89(10); 1987; 394-397

The solidification properties of commercially refined and bleached sal fats have been investigated. The inconsistency in their solidification behaviour has been shown to be due to the presence of minor components namely the triglycerides containing 9,10-dihydroxystearic acid (DHS-TGs) and diglycerides (DGs). The effect of DGs individually and in combination with DHS-TGs on the solidification properties of purified normal triglycerides (TGs) of sal fat has shown that DGs increased the Alpha lifetime of the crystals, delayed the crystallization, reduced heats of fusion and reduced solid fat indices of TGs at all temp. The effect of DGs could be counteracted by DHS-TGs the effect of which was opposite to that of DGs. When DGs and DHS-TGs incorporated together in equal concn. the effect of DHS-TGs was more perceptible. When the proportion of DGs was more than that of DHS-TGs, the effect of DGs was discernable particularly on the cooling curve. It is concluded that the concn. of both DGs and DHS-TGs has to be kept at a min. in order to get fat fractions with uniform solidification properties. AS

Oils

Bernert (JTJr), Kilbourne (EM), Akins (JR), Meredith (NK) and Abaitua Borda (IS). Compositional analysis of oil samples implicated in the Spanish toxic oil syndrome. *Journal of Food Science* 52(6); 1987; 1562-1659

Methodology for the chemical analyses was developed in this study and the results of the composition of oil samples from Spanish "Toxic oil: syndrome (TOS) epidemic were presented in this paper. The samples were examined for fatty acids, sterols, and fatty acid anilides to determine whether the chemical composition throws light on the natural history of the epidemic and classification and selection of samples. The results showed that fatty acid anilides were the most useful markers in case samples nearly about 62% and presence of rapeseed oil was significantly more prevalent and the ratios of individual anilides were found to be quite constant in these oils and most consistent with their formation in the original undiluted rapeseed oil. NGKR

Gamble (MH), Rice (P) and Selman (JD). Distribution and morphology of oil deposits in some deep fried products. *Journal of Food Science* 52(6); 1987; 1742-1743, 1745

The distribution of oil taken up during frying was investigated in chips, snacks and French fries using red stained oil. The effect of predrying by microwave heating and lyophilization was also examined in chips. The results showed that some oil uptake occurred during frying which was not entirely due to frying. The oil distribution depended upon the food structure and loss of moisture. It also depended on the slice thickness, moisture content its distribution and ease of transfer cutting edge and degree of blistering during frying. The oil was associated with areas of moisture loss. NGKR

Hsu (N), Diosady (LL) and Rubin (LJ). Catalytic behavior of palladium in the hydrogenation of edible oils. *Journal of the American Oil Chemists' Society* 65(3); 1988; 349-356

Palladium supported on alumina was used to hydrogenate soybean and canola oil. Previous literature reports indicated that palladium forms more trans isomers than nickel. At 750 psig, 50 p.p.m. palladium, and at 70 C, only 9.4% trans were formed when canola oil was hydrogenated to IV 74. In general, high pressure and low temp. favored low trans formation with no appreciable loss in catalyst activity. The effect of pressure, temp. and catalyst concn. on reaction rate, trans formation and selectivity is presented. A survey of various catalyst supports is discussed. Apparent activation energies of 6.3 to 8.9 kcal/mol were obtained; they are in good agreement with values reported in the literature. AS

Canola oils

- 2186 Abraham (V) and deMan (JM). Removal of sulphur compounds from canola oil. *Journal of the American Oil Chemists' Society* 65(3); 1988; 392-395

The effect of a number of physical methods for the removal of sulphur compounds from canola oil was investigated. The methods tested included laboratory deodorization and use of catalyst and of bleaching earth. Nine temp. time combinations were used for the deodorization. Bleaching earth had little effect on the removal of sulphur compounds from the oil. Other methods removed part of the sulphur. High temp. longer time and high vacuum for deodorization facilitated the complete removal of volatile sulphur compounds. Treatment of oil with catalyst removed most of the volatile sulphur and part of the Raney nickel sulphur. AS

- 2187 Sosulski (K), Sosulski (FW) and Coxworth (E). Carbohyrase hydrolysis of canola to enhance oil extraction with hexane. *Journal of the American Oil Chemists' Society* 65(3); 1988; 357-361

Hydrolysis of three canola cvs with carbohyrase reduced oil extraction time and increased oil yield. The optimum pretreatment before hexane extraction of oil was flaking, autoclaving, adjustment to 30% seed moisture including 0.12% enzyme concn. (g enzyme protein/100 g flakes), and incubation for 12 h at 50 C, followed by drying to 4% moisture. Hexane extraction was enhanced by grinding the flakes. The relative order of enzyme efficiency in enhancement of oil extraction was mixed activity enzyme > Beta glucanase > pectinase > hemicellulase > cellulase. AS

Fungal oils

- 2188 Sunita Joshi) and Mathur (JMS). Studies on interesterification of fungal oil. *FAT Science and Technology* 89(10); 1987; 408-409

Intesterification of fungal oil (*Fusarium oxysporum* f. Sp. Lini) was carried out using sodium methoxide as catalyst. Intramolecular rearrangement of fatty acids in the triglyceride molecule gives rise to a randomized mixture leading to a new fat which is rich in saturated glycerides. BV

Rapeseed oils

- 2189 Peterka (S) and Fenwick (GR). The use of flash chromatography for the isolation and purification of glucosinolates (Mustard oil glycosides) *FAT Science and Technology* 90(2); 1988; 61-64

A rapid method for the isolation of several important glucosinolates in large (gram) amounts using flash chromatography is described. Emphasis has been paid to the major glucosinolates of the seed meal and green material of rape, *Brassica napus*, to enable further studies on their bioactivity and to supply standards for analytical purposes

The application of the method for the isolation of other glucosinolates is discussed. AS

- 2190 Transfeld (P). Bleaching of rapeseed oil in the multi-step countercurrent cascade. *Lebensmittelindustrie* 34(5); 1987; 224-227

Rice bran oils

- 2191 Millwalla (RH) and Shitole (AD). Refining of rice bran oil employing reesterification technique. *Journal of the Oil Technologists' Association of India* 19(3); 1987; 70-71

The free fatty acid (FFA) content, colour and unsaponifiable matter of rice bran oil was determined at various stages of processing which included treatment with oxalic acid/or citric acid and bleaching/before or after dewaxing. On reesterification with glycerol these samples contained FFA ranging from 5.0 to 8.9% where the oil content before treatment was 40%. The partially reesterified oil on further refining and bleaching showed a colour value of 26.0 to 32.5 (Y + 5R) units. The deodourised oil had an unsaponifiable matter content of 3.9 to 4.2%. KAR

- 2192 Tikkoo (AK), Maharaj Narain) and Saxena (RP). Rice bran stabilizer using infrared energy as heat sources. *Journal of the Oil Technologists' Association of India* 19(3); 1987; 54-55

A bran stabilizer consisting of a trough paddle conveyor, infrared bulbs, feeding hopper and a drive unit with a capacity of 5 kg/h was developed (design diagrammatically presented). Bran was treated for 5, 10 and 15 min at 110 °C. using infra-red ray and stored for 165 days. Results showed that infrared energy treated rice bran could be stored upto 60 days where in the free fatty acids content did not increase beyond 5%. KAR

Soybean oils

- 2193 Warner (K), Frankel (EN) and Moulton (KJ). Flavour evaluation of crude oil to predict the quality of soybean oil. *Journal of the American Oil Chemists' Society* 65(3); 1988; 386-391

The quality of crude oil obtained from soybean of different sources and treatments was determined by sensory evaluation and gas-chromatography. The flavour quality of crude oils from untempered soybean was poorer than that of oils from soybean steam-tempered at 104 °C for 4 min. Crude oils extracted from soybean damaged by storage at 45 °C and 13% moisture received decreasing flavour scores with prolonged storage time. MNK

Sunflower oils

- 2194 Horstmann (P) and Montag (A). Determination of sunflower oil in safflower oil by sterol analysis. *FAT Science and Technology* 89(10); 1987; 381-388 (De).

- 2195 Moulton (KJSr). Turbidimetric measurement of wax in sunflower oil. *Journal of the American Oil Chemists' Society* 65(3); 1988; 367-368

Wax content in sunflower oil may be estimated quickly at room temp. by a turbidimetric method. Five ml of a thoroughly mixed oil/solvent mixture is transferred to a 13-mm sample vial and inserted in a turbidimeter. Instrument readings are converted directly to wax content in the original sunflower oil by means of a correlation equation. This rapid method can be used over a wider range of wax values than previous methods. AS

SPICES AND CONDIMENTS

Spices

- 2196 Akgul (A) and Kivanc (M). Inhibitory effects of selected Turkish spices and oregano components on some foodborne fungi. *International Journal of Food Microbiology* 6(3); 1988; 263-268

The inhibitory effects of 10 selected Turkish spices, oregano essential oil, thymol and carvacrol towards growth of 9 foodborne fungi were investigated in culture media with pH 3.5 and 5.5. The antifungal effects of sodium chloride, sorbic acid and sodium benzoate and the combined use of oregano with sodium chloride were also tested under the same conditions for comparison. Of the spices tested, only oregano at 1.0, 1.5, 2.0% (w/v) levels showed effect on all fungi. 8% (w/v) sodium chloride was less effective than oregano. Oregano essential oil, thymol or carvacrol at concn. of 0.025% and 0.05% completely inhibited the growth of all fungi, showing greater inhibition than sorbic acid at the same concn. The combined use of oregano and sodium chloride exhibited a synergistic antifungal effect. AS

- 2197 Anisa Ath-har (M), Prakash (HS) and Shetty (HS). Mycoflora of Indian spices with special reference to aflatoxin producing isolates of *Aspergillus flavus*. *Indian Journal of Microbiology* 28(1-2); 1988; 125-127

Pepper, chilli, coriander, cumin, fennel, fenugreek and mustard collected from market were analysed for fungi and for aflatoxigenic isolates of *Asp. flavus*. The dominant sp. of microflora found included *Asp. flavus*, *Asp. niger*, *Asp. nidulans*, *Asp. sydowi*, *Asp. ochraceus*, *Penicillium* sp. and *Rhizopus*. Incidence of *Asp. flavus* colonies were significantly higher in fenugreek (50.2%) followed by chilli, pepper, coriander, fennel, cumin and mustard. 48 isolates of *Asp. flavus* were randomly selected and analysed for aflatoxin. 50% of the isolates from pepper and mustard, 60% of coriander, 40% of cumin, 25% of chilli, and 18.75% of fenugreek isolates were positive for aflatoxin while all the 4 fennel isolates were negative for aflatoxin. KAR

- 2198 Antai (SP). Study of the *Bacillus* flora of Nigerian spices. *International Journal of Food Microbiology* 6(3); 1988; 259-261

Bacteriological examination of 230 samples of five different unprocessed spices (alligator pepper, red pepper, black pepper, thyme and curry powder) collected randomly from Port Harcourt main markets revealed that the spices were highly contaminated, with bacterial counts ranging from 1.8×10^4 to 1.1×10^6 . *Bacillus cereus* was isolated in high numbers in the majority of the 230 samples examined. It was also observed that other *Bacillus* sp. including *B. subtilis*, *B. polymyxa* and *B. coagulans* occurred in significant numbers.

Chillies

- 199 Blankenship (LC), Craven (SE), Leffler (RG) and Custer (C). Growth of *Clostridium perfringens* in cooked chilli during cooling. *Applied and Environmental Microbiology* 54(5); 1988; 1104-1108

Clostridium perfringens one of the food poisoning causative organism is often found to develop in cooked food stored at slightly elevated temp. Thus rapid cooling of cooked food to around 4 °C is recommended, but it may not always be practicable. Studies conducted with cooked chilli which was inoculated with *C. perfringens* and held at temp. ranging 20 to 50 °C indicated that samples promoted growth of the organism at 35 °C or above within about 2 h. RJ

- 200 Tectia (MS) and Raina (BL). Technological quality evaluation of chillies grown in Haryana. *Indian Cocoa, Arecanut & Spices Journal* 1(1); 1987; 18-20

Six red chillies (*Capsicum annum* L.) samples collected from Haryana State (India) were analysed for physical and chemical characteristics. The pods were medium to long size (5.79-10.13 cm) with an average girth of 1.26 - 1.86 cm and are conical to oblong tapering shape and mostly with uneven shrivelled surface. The extraneous matter in commercial chillies was between 6.75 and 7.76%. Seed to pod ratio ranged from 1:2.04 to 1:3.16. Moisture content ranged from 8.71 to 10.46%. Considerable variation was observed in total extractable colour (0.22 to 0.56%) and capsaicin content (98.7 mg % to 199.9 mg %). Max. total extractable colour (0.56%) was recorded in sample from Murthal and max. capsaicin content (199.9 mg %) in sample from Pataudi I. KAR

Mustard

- 2201 Fischbach (R) and Kokini (JL). Effect of aging and mustard flour on rheological properties of model O/W emulsion. *Journal of Food Science* 52(6); 1987; 1748-1749

The evaluation of mustard flour in effecting the stability of a simple salad dressing O/W emulsion containing vinegar and the gums xanthan and propylene glycol alginate. The results of experiments over a two month period conducted on xanthan and propylenoglycol alginate stabilised model salad dressing emulsions to which 0.25%, 0.35%, 0.5%, 0.75% and upto 1.0% mustard flour was added showed that mustard flour helped in emulsion stabilisation which was optimum at 0.35 -

0.5% mustard flour. This phenomenon was due to the interactions of proteins and carbohydrates which have surface active properties. NGKR

Turmeric

- 2202 Pujari (PD), Patil (RB) and Sakpal (RT). Studies on growth, yield and quality components in different turmeric varieties. Indian Cocoa, Arecanut & Spices Journal 11(1); 1987; 15-17

8 turmeric var. (Krishna, Rayapuri, Sugamdhum, Alleppey, Erode, Salem, Duggirala, Tekurpeta) grown in the year 1983-84 were evaluated for curing %, curcumin content and yield of curcumin/ha. Curing % was max. with Salem (19.31%) followed by Erode (19.15%) and Alleppey (19%). Curcumin content was highest in Salem (4.8%) followed by Alleppey (4.4%) and Duggirala (3.9%). The yield of curcumin was max. with Salem (2.9 gtl/ha) followed by Duggirala (2.35 gtl/ha) and Sugamdhum (2.19 gtl/ha). The var. Salem, Duggirala, and Sugamdhum have been recommended for large scale cultivation. KAR

SENSORY EVALUATION

- 2203 Newell (GJ) and MacFarlane (JD). Expanded tables for multiple comparison procedures in the analysis of ranked data. Journal of Food Science 52(6); 1987; 1721-1725

As alternatives to test developed by Kramer multiple comparison procedures involving Friedman rank sums for the analyses of ranked data, expanded tables for these multiple comparison procedures were presented to accomodate the range of panelists and samples usually encountered in sensory evaluation experiments involving ranked data. NGKR

- 2204 Ross (EW), Klicka (MV), Kalick (J) and Branagan (MT). A time temperature model for sensory acceptance of a military ration. Journal of Food Science 52(6); 1987; 1712-1717

Methods to similar to reaction parameters from physical or chemical measurements were used to estimate parameters based instead on sensory data for meal ready to eat during 5 yrs of storage and the results are presented for individual items and for the most important items in this paper. NGKR

FOOD STORAGE

Nil

INFESTATION CONTROL AND PESTICIDES

- 2205 Marcandier (S) and Khachatourians (GG). Evolution of relative humidity and temperature within a closed chamber used for entomological studies. *Canadian Entomologist* 119(10); 1987; 893-900

A simple experimental device has been described in this paper which uses saturated salt solutions to control R.H. This device was suitable for studies requiring a 14-82% RH (plus or minus 3%) at 27 plus or minus 0.7 C. The RH and temp. set points were not affected by the presence of grasshoppers despite daily putrifactions and offers an easy and inexpensive setup combined with a large surface area of salt solution. NGKR

BIOCHEMISTRY AND NUTRITION

Biochemistry

- 2206 Airaud (CB), Gayte-Sorbier (A) and Armand (P). Stability of glutamine and pyroglutamic acid under model system conditions. Influence of physical and technological factors. *Journal of Food Science* 52(6); 1987; 1750-1752

The stability of glutamine and pyroglutamic acid as regards pH, temp. and oxygen was studied during storage and two thermal processes, the residual products and those which appeared being determined. Contrary to glutamic acid, the two derivatives are labile below pH 2 and above pH 13 and alteration occurs much faster. Temp. increase promotes this phenomenon. Glutamic and pyroglutamic acids convert reversibly into one another, more or less quickly and completely according to the conditions. Glutamine changes during heating in two steps, first into glutamic acid, then into pyroglutamic acid if the pH values are not extreme. The influence of pH conditions on the direction and the rate of the reaction are indicated. AS

- 2207 Bjorck (IM) and Nyman (ME). In vitro effects of phytic acid and polyphenols on starch digestion and fiber degradation. *Journal of Food Science* 52(6); 1987; 1588-1594

- 2208 Cadden (A-M). Comparative effects of particle size reduction of physical structure and water binding properties of several plant fibers. *Journal of Food Science* 52(6); 1987; 1595-1599; 1631

Reducing the particle size of AACC wheat bran decreased water-holding capacity, due, in part, to the collapse of its fiber matrix. Physical structure of commercial oat bran collapsed during manufacture and further grinding had limited effect. Physical structure of microcrystalline celluloses and guar gums did not differ between product types. The amount of water held by oat bran and microcrystalline properties of guar gum were not affected. Physical structure of die-

tary fiber must be considered if water-binding properties are to be useful predictors of stool bulking efficiency.

- 2209 Koseki (M), Kitabataka (N), Doi (E), Yasuno (T), Ogino (S), Kazama (M) and Doguchi (M). Binding of taurocholate by pectin in the presence of calcium ions. *Journal of Food Science* 52(6); 1987; 1744-1745

In this study the amount of bile acids bound by pectin by calculation from the taurocholate concn. and water which separated from the pectin gel was determined. This has been carried out using low methoxyl pectin and calcium lactate. Water in calcium pectate gel was partially separated from the B by filtration through a glass filter and the taurocholate bound by pectin was calculated after the measurement of the taurocholate in the filtrate by U. V. absorption method. It was seen that the amount of taurocholate bound by pectin increased linearly with increase in pectin concn irrespective of time. From the results it was found that 1 gm pectin bound a max. of 6 μ moles of taurocholate. NGKR

- 2210 Krishnamachar (S) and Mickelsen (O). The influence of different carbohydrate sources on blood glucose levels and satiety: Effect of physical activity on blood glucose response. *Human Nutrition: Food Sciences and Nutrition* 41F(1); 1987; 29-39

- 2211 Rendleman (JAJr). Complexation of calcium by melanoidin and its role in determining bioavailability. *Journal of Food Science* 52(6); 1987; 1699-1705

In this investigation binding studies were conducted at pH 7.0 of model melanoidins like coffee and toasted bread which contain brown pigments formed by nonenzymatic browning reactions of amino acids with reducing sugars and glyoxal. It was seen that pigments in coffee brew and milk free toasted bread had no measureable calcium binding ability. This showed that there might be important structural differences between pigments formed in food systems and those formed by interaction of simple amino acids with sugars. NGKR

- 2212 Vinot (C), Durand (P), Leclercq (M) and Bourgeay-Causse (M). Studies on the biochemical composition of *Undaria pinnatifida* with a view to its utilisation in human feeding. *Sciences des Aliments* 7(4); 1987; 589-601

Amino acids

- 2213 Whitfield (FB), Mottram (DS), Brock (S), Puckey (DJ) and Salter (LJ). Effect of phospholipid on the formation of volatile heterocyclic compounds in heated aqueous solutions of amino acids and ribose. *Journal of the Science of Food and Agriculture* 42(3); 1988; 261-272

In this paper a study of the effect of lipid on the production of volatile heterocyclic compounds in Maillard mixtures has been presented. The concn. of 68 heterocyclic compounds produced by heating a series of amino acid-ribose and lecithin-amino acid-ribose reaction mixtures at 140 C for 1 h were measured, after headspace collection

on Tenax GC1 by capillary GC-MS. The amino acids studied were glycine, lysine and cysteine and the classes of heterocyclic compounds quantified were pyrazines(14), pyridines(7), furans (14), thiophenes(26) and thiazoles(7). These studies showed that the addition of lecithin to the simple Maillard reaction mixtures led to a reduction in the concn. of many of the heterocyclic compounds formed in these reactions and it has been observed that phospholipids in foodstuffs such as meat products could exert a quenching effect on the amount of compounds formed in Maillard reactions during the cooking of food and number of volatile compounds formed by the reaction of lipid degradation products with Maillard reaction intermediates were also identified. NGKR

- 214 Tan (H), Sen (AC), Wheeler (WB), Cornell (JA) and Wei (CI). A kinetic study of the reaction of aqueous chlorine and chlorine dioxide with amino acids, peptides and proteins. *Journal of Food Science* 52(6); 1987; 1706-1711, 1717

Reactions involving aqueous chlorine and chlorine dioxide with amino acid in 0.1M sodium phosphate buffer at pH 3, 6 and 9 were studied using iodometric and spectrophotometric techniques. The N, N diethyl-p-phenylene-diamine (DPD) titrimetric technique was used to differentiate the chlorinated species formed in the reaction mixture. Chlorinated derivatives of amino acids were readily formed and then decomposed. Except in the mixtures with proline, hydroxyproline and glycine, the rate of loss of available chlorine in the reaction mixtures followed first order kinetics and was found to be pH dependent. Only a few amino acids reacted with aqueous chlorine dioxide. The reaction also followed pseudo-first order kinetics. Reactions of three peptides and two proteins with aqueous chlorine and chlorine dioxide at pH 6.0 were also studied. Except for aspartame, they reacted rapidly with both chlorine compounds. AS

Nutrition

- 215 Cohen (SH) and Voyle (CA). Microstructural evaluation of nutritional sustainment module components. *Activities Report* 39(1); 1987; 151-153
- 216 Edwards (JSA). An approach to the application of nutrition in food management. *British Food Journal* 89(941); 1987; 140-142
- 217 Moberg (A), Hallmans (G), Sjostrom (R) and Wing (KR). The effect of wheat bran on the absorption and accumulation of cadmium in rats. *British Journal of Nutrition* 58(3); 1987; 383-391

Accumulation of cadmium in rats due to inclusion of bran to endosperm crisp bread in a composite diet was studied. Results from 109 cadmium test showed that very little of the cadmium is available for absorption. MVG

- 218 Vigne (JL), Lairon (D), Borel (P), Portugal (H), Pauli (A-M), Hauton (JC) and Lafont (H). Effect of pectin, wheat bran and cellulose on serum lipids and lipoproteins in rats fed on a low-or high fat diet. *British Journal of Nutrition* 58(3); 1987; 405-413

Influence of low methoxyl pectin and wheat bran on lipid composition of the different classes of lipoproteins in rats fed on a balanced diet or diet rich in saturated fats and cholesterol was evaluated and the values obtained were compared with those of the two control groups which were fed either fibre-depleted diet or a diet containing cellulose as indigestible agent. Results showed that low methoxyl pectin and wheat bran beneficially modified the serum triglyceride and cholesterol variables except very-low-density lipoproteins (VLDL) -triglycerides. However, the magnitude of the effect of each individual type of fibre was dependent on the fat and cholesterol content of the diet, suggesting the existence of different mechanisms of action. MVG

- 2219 Visweswara Rao (K). Vital statistics and nutritional status of Indians. Indian Journal of Nutrition and Dietetics 24(9); 1987; 272-297

This review besides covering the life expectancy of Indians also briefly reviews caloric protein adequacies in the dietaries of preschool and school children, nutritional deficiencies observed in different age groups, & prevalence of anaemia by age and sex, mortality rate of children due to Kwashiorkor, and per cent prevalence of under nutritional in rural Hyderabad preschool children. NGKR

TOXICOLOGY

Mycotoxins

Aflatoxins

- 2220 Mahjoub (A) and Bullerman (LB). Mold growth and aflatoxin production on whole olives and olive pastes. Sciences des Aliments 7(4); 1987; 629-636

Pesticide residues

- 2221 Al-Samariee (AI), Shaker (KAM) and Al-Bassomy (MA). Residue levels of three organophosphorus insecticides in sweet pepper grown in commercial greenhouses. Pesticide Science 22(3); 1988; 189-194

The organophosphorus insecticides diazinon, chlorpyrifos and pirimiphosmethyl were investigated upon for their degradation rates and residue levels in the leaves and fruits of pepper plants grown in commercial greenhouses (Temp. range 18-30 °C). Analysis of residues in leaves and fruits was carried out using GLC (with flame photometric detector) at intervals following application (0.05 to 0.09% spray-concn.). The initial residue of diazinon in leaves was higher than that of the other two insecticides, while its dissipation rate was faster; the dissipation of chlorpyrifos in fruits was faster than diazinon. The max. residue levels (MRL) of diazinon (0.5 mg kg⁻¹) and chlorpyrifos (0.1 mg kg⁻¹) were reached after 13 and 8 days of appli-

cation resp. With diazinon and pirimiphos-methyl, sprayed 3 wks before inflorescence, very low concn. of both insecticides were found in fruits, although these compounds have no systemic behaviour. The dissipation rate of chlorpyrifos in harvested pepper held at room temp. showed that the residue had not dropped below the MRL after 11 days holding. Variation in residue levels of the insecticides between the leaves and fruit tissues could be attributed to differences in surface biochemical constituents of leaves and fruits. GB

FOOD LAWS AND REGULATIONS

Nil



GENERAL

- 222 Achaya (KT). Indian food nutritious. Level of awareness, the disparity, striking difference. Indian Food Industry 7(1); 1988; 16-18

Nutritional status in general, prevailing both in urban and rural parts of India and its awareness as governed by education specially is covered. Its disparity and the striking difference in respect of nutritional status between rural and urban dwellers is dealt in detail. GP

- 223 Aggarwal (RK). Special needs and problem in marketing processed foods. Indian Food Industry 7(1); 1988; 56-61

Discusses negative disposition of consumer, high price of processed foods and economic consideration, inadequate marketing and distribution, quality problems with respect to ingredients and packaging, limited product range, non availability of sufficient marketing information/food habit survey data, competition between established companies and small units creating consumers awareness on processed food, right product, right packaging, right price, right promotional, channel, product range and the end user and the right distribution channel. GP

- 224 Amla (BL). R & D can contribute to speedy development. Processing industry, land resource, frozen food, irradiation industry. Indian Food Industry 7(1); 1988; 1-5

- 225 Blackwell (JH), Nolan (EJ) and Rickansrud (DA). Total caloric input of a thermal process as an index of lethality for food-and-mouth disease virus. Journal of Food Science 53(1); 1988; 185-190

- 226 Khanna (SK), Upreti (KK) and Singh (GB). A comparative study on the pattern and magnitude of adulteration of foodstuffs during two decennial survey terms. Indian Journal of Nutrition and Dietetics 24(10); 1987; 310-318

The survey was carried out to find the extent of adulteration of food commodities in the state of Uttar Pradesh (India) under the food contamination monitoring programmes. It was found that marginal drop of 3.5% in the net adulteration. Adulteration was highest in milk (37%) lowest in cereals and pulses (9.5%). The other categories and miscellaneous products registered an adulteration of 14-17%. Compared to the previous survey there was an enormous increase from 2.6 to 31% vanaspati adulteration. However, the percentage of adulteration showed a reduction of 22.05 from the previous 25.5. The adulteration of edible oil was 16%, and butter and ghee was 14.3%. Adulteration in the coloured samples was 14.4%. NGKR

- 2227 Potty (VH). Policy changes vital. Main components and regulatory power. *Indian Food Industry* 7(1); 1988; 6-8

Different methods for the promotion of Agro-based Industries have been suggested with special reference to food processing industries which are classified as (a) basic food industries comprising rice milling, flour mills, legume and oilseed processing and sugar/jaggery and (b) bakery products, dairy products, canned fruit and vegetables etc. These are governed by the quality, availability and compatibility of raw materials and the appropriate technologies. GP

FOOD PROCESSING

Aseptic processing

- 2228 Saguy (I). Constraints to quality optimization in aseptic processing. *Journal of Food Science* 53(1); 1988; 306-307, 310

The optimization incorporated constraints, such as health requirements to destroy pathogens, spoilage-causing microorganisms and enzymes inactivation. Simultaneously, the optimal process had to maximize chemical and sensory attributes, nutrients retention and overall quality. Linear programming was utilized to conform with all the aforementioned constraints and to derive the optimal processing time and temp. The method offered a straight forward procedure for the optimization of aseptic processing and could be utilized in the implementation of optimal high temp. short time processes. AS

FOOD PACKAGING

- 2229 Heil (JR), Hamblin (CL), Bernhard (RA), Merson (RL) and Patino (C). Evaluation of mechanical deaeration parameters for high vacuum canned foods. *Journal of Food Science* 53(1); 1988; 157-161

In mechanical deaeration of sliced apples, pears and cut green beans, increasing fill temp. or chamber vacuum enhanced product deaeration, whereas increasing swell time under vacuum from 3 to 9 sec did not ($P < 0.05$). Product ability to resist explosion when subjected to sudden vacuum varied with products, firmness and temp. Control of fill temp. was necessary for proper removal of oxygen from the can products. AS

- 2230 Urata (Y). Application of tocopherol for PP resin for food packaging. *Packaging Japan* 9(46); 1988; 49-54

- 2231 Wells (JH) and Singh (RP). Application of time-temperature indicators in monitoring changes in quality attributes of perishable and semipermanishable foods. *Journal of Food Science* 53(1); 1988; 148-152, 156

The response of full-history time temp. indicators attached

different packages containing five perishable and semiperishable foods (tomatoes, naked and wrapped lettuce, canned fruitcake, and UHT sterilized milk) was studied. The products were stored at constant and variable temp. treatments simulating commercial storage and handling practices. Changes in specific quality attributes were periodically evaluated by means of sensory analysis, and the monitored attributes were correlated with indicator response. Statistical analysis showed significant correlations ($P < 0.05$) between the indicators studied and quality changes in tomatoes and UHT sterilized milk. AS

Packaging materials

Bottles

- 2232 Asami (Y). Rapid growth of PET bottle in drink container market. *Packaging Japan* 9(46); 1988; 56-58

Cans

- 2233 Miura (T). Recent trend and future prospect in can drink market centering around steel can. *Packaging Japan* 9(46); 1988; 19-22.

Containers

- 2234 Anon. Trend and future of heat proof food container. *Packaging Japan* 9(45); 1988; 29-34
- 2235 Ishida (O). Prospect of food packaging containers in Japan. *Packaging Japan* 9(45); 1988; 21-23

FOOD ENGINEERING AND EQUIPMENT

Engineering

- 2236 Bhowmik (SR) and Hayakawa (K-I). Quality retention and steam consumption of selected thermal processes. *Lebensmittel-Wissenschaft und-Technologie* 21(1); 1988; 13-19

Three types of retort temp. policies (a standard process, a ramp function and a square wave type) were examined for nutrient retention and steam consumption by using 211 x 300 cans of a food simulator. Computer programs were developed to estimate max. nutrient retention for selected temp. profiles. Excellent agreement was found between the theoretically predicated by using these programs and experimentally determined results. From the study of nutrient retention and steam consumption for the three there were no significant differences in the theoretically estimated nutrient retentions and steam consumptions owing to the profiles. It was observed that ramp function and a single square wave profile produced slightly higher nutrient retention while using slightly less steam consumption compared to that required by the process using a standard temp. profile. There might be a merit in using the two nonstandard retort temp. policies because of about

10% reduction in heating time. AS

- 2237 Datta (AK) and Teixeira (AA). Numerically predicted transient temperature and velocity profiles during natural convection heating of canned liquid foods. *Journal of Food Science* 53(1); 1988; 191-195

Numerically predicted transient flow patterns and temp. profiles during natural convection heat transfer of a liquid in a uniformly heated cylindrical can were presented for the first time. A recirculating flow pattern was predicted inside the cylindrical container. The liquid was found to be stratified inside the container with increasing temp. towards the top. The slowest heating location in the fluid was a donut-shaped region close to the bottom of the can at about one-tenth the can height. AS

- 2238 Dolan (KD), Paul Singh (R) and Heldman (DR). Prediction of temperature in frozen foods exposed to solar radiation. *Journal of Food Processing and Preservation* 11(2); 1987; 135-158

Simultaneous convective and radiative boundary conditions were incorporated into a one-dimensional three time level implicit finite difference scheme in rectangular coordinates. The scheme was used to calculate temp. profiles and temp. histories in a packaged frozen food exposed to the sun. The solution was verified by thawing slabs of a standard test material (Karlsruhe test substance) and orange juice in different environments. Procedures were developed to measure the temp. distribution and to estimate the radiation properties of the package surface. The max. thickness of the slabs was 38 mm. The agreement between experimental and predicted food surface and center temp. profiles was determined by corresponding R^2 values ranging from 0.872 to 0.998. The computer programme was also used to predict temp. profiles in a 100 x 92 x 92 cm pallet of frozen food exposed to different environmental conditions. Conditions were simulated by varying initial product temp., product thermal properties, air resistance between the product and the package, external heat transfer coeff. ambient temp. and radiation surface properties of the carton. AS

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

Chemistry

- 2239 Govindan (S) and Shanmugasundaram (ERS). Preparation chemical and amino acid composition of protein concentrate from agathi (*Sesbania grandiflora*) leaves. *Indian Journal of Nutrition and Dietetics* 24(11); 1987; 342-345

Leaf protein conc. (LPC) was prepared from the leaves of *Agathi* (*Sesbania grandiflora*) and their chemical and amino acid composition are presented. The LPC was prepared from fresh leaves and total N, fibre, mineral matter, carotene and the essential amino acid contents were determined. Fresh leaf contained about 8.4% protein and the yield of LPC was 6.0 g from 100 g. fresh leaf. Air dried LPC contained total N 10.3 g, mineral matter 3.3 g Iron 76.7 mg, Ca 512 mg and Beta-carotene 66.35 μ g per 100 g. The values (g/16 g N) for essential amino acids were; arginine 6.1, histidine 2.5, isoleucine 5.8, leucine 10.0, lysine 6.2, methionine 2.9, phenylalanine 6.5, threonine 4.7 and valine 6.3. NGKR

- 2240 Hill (CGJr), Hedinodottir (R) and Amundson (CH). Surface active properties and cleaning efficacy of materials derived from lactitol. *Journal of Food Processing and Preservation* 11(2); 1987; 111-134

- 2241 Pollio (ML), Kitic (D), Favetto (GJ) and Chirffe (J). A note about the correct water activity value of saturated potassium nitrate at 25 C. *Lebensmittel-Wissenschaft und-Technologie* 21(1); 1988; 66-67

A re-evaluation of the water activity of saturated solution of potassium nitrate was performed in view of the discrepancy which exists on its exact water activity value. Four different brands of potassium nitrate, were used and ten detn. of water activity were made for each one. The resulting mean value and its confidence interval (95% level) was 0.927 plus or minus 0.001. This result, which agrees with a previous theoretical prediction of water activity in saturated potassium nitrate, indicates that the value 0.936 used by many authors should no longer be used. AS

Chemistry (Analytical)

- 2242 Fujii (T), Jimba (H), Ogura (M), Arimoto (H) and Ozaki (K). Some applications of the surface ionisation detector in gas chromatography. *Analyst* 113(5); 1988; 789-792

The application of the surface ionisation detector to gas chromatography is illustrated using six examples of the analysis of formulations: (1) a butylamine mixture, (2) a polyaromatic hydrocarbon mixture, (3) a terpene mixture, (4) a steroid mixture, (5) a drug mixture and (6) the detn. of lidocaine in serum. Advantageous sensitivity (better detection limit), substance specificity and applicability are reported. AS

- 2243 Knowles (DE), Richter (BE), Wygant (MB), Nixon (L) and Andersen (MR). Supercritical fluid chromatography. A new technique for AOAC. *Journal of the Association of Official Analytical Chemists* 71(3); 1988; 451-457

Supercritical fluid chromatography (SFC) is a chromatographic technique that, in many ways, is a hybrid of gas chromatography and liquid chromatography and offers many advantages over both. As this technique continues to grow in use, SFC will become very advantageous to the AOAC analyst. AS

FOOD MICROBIOLOGY AND HYGIENE

Enzymes

Cellulases

- 2244 Martinez (GP) and Llopis (JLL). Production of cellulases from bacteria. Regulation and genetic improvement. *Revista de Agroquímica y Tecnología de Alimentos* 27(2); 1987; 195-213

Reviews the state of the art of enzyme regulation and genetic improvement of cellulolytic enzymes particularly those derived from bacteria (i.e. mutation and cloning). Possible use of these enzymes as an alternative to current commercial cellulases, generally derived from fungi, is also discussed. BV

Lipases

- 2245 Knuckles (BE). Effect of phytate and other Myo-inositol phosphate esters on lipase activity. *Journal of Food Science* 53(1); 1988; 250-252

The effects of phytate and other myo-inositol phosphate esters (containing one or more phosphate groups) on lipase activity were evaluated by an in vitro procedure. Porcine pancreatic lipase was treated with four concn. of phytate (0-4 mM) and myo-inositol-2-monophosphate (0.12 mM). The lipase was also treated with six myo-inositol phosphate ester fractions (4 mM) isolated from hydrolyzed phytate. The enzyme was incubated (0.5 h) with the esters prior to addition of substrate and measurement of fatty acid production. Phytate at 4 mM and 1-2 MP at 12 mM caused significant inhibition of lipase, 14.5% and 8.2% resp. The isolated inositol phosphate ester fractions caused significant decrease in lipase activity. The decrease in enzymatic activity was highly correlated ($r = 0.989$) with degree of inositol phosphorylation. AS

Ethyl alcohol

- 2246 Iyer (KR) and Vasudevan (TN). Production of ethanol using immobilized baker's yeast in vertical plate reactor. *Research and Industry, India* 33(2); 1988; 129-131

A vertical plate reactor containing immobilized Baker's yeast cells was used for batchwise production of ethanol. Substrate conversion to the extent of 89.36% and alcohol yields of 66.7% were obtained. Ethanol production was dependent on concn. of yeast in the heads and flow-rates of the feed medium. AS

- 2247 Marwaha (SS), Kennedy (JF) and Sehgal (VK). Simulation of process conditions of continuous ethanol fermentation of whey permeate using alginate entrapped *Kluyveromyces marxianus* NCYC 179 cells in a packed bed reactor system. *Process Biochemistry* 23(1); 1988; 17-22

This paper reports on the formulation of simulation models for evaluating the operational suitability and stability of packed-bed reactor system using alginate-entrapped *Kluyveromyces marxianus* NCYC 179 cells for the continuous ethanol generation from whey permeate. The experimental and simulated results confirm the stability of the above reactor system for prolonged operation under optimal process conditions. From the observed and predicted data, beads ranging from 2.5-3.0 mm in size, an activation duration of beads between 18-24 h, and a substrate concn. of 200 g l^{-1} at a flow rate $F = 142 \text{ ml h}^{-1}$, were considered optimal to utilize the substrate economically in order to attain the highest product yield. A max. ethanol productivity of $28.21 \text{ g l}^{-1} \text{ h}^{-1}$ was achieved at $F = 142 \text{ ml h}^{-1}$ and 75% substrate consumption (substrate feed rate in the inflowing medium was $200 \text{ g lactose l}^{-1}$). The max. specific ethanol production (q_{pi}) and max. specific lactose uptake (q_{si}) of the immobilized yeast culture were found to be $3.88 \text{ g ethanol g immobilized cells h}^{-1} \times 10^{-2}$ and $8.75 \text{ g lactose consumed g}^{-1} \text{ immobilized cells h}^{-1} \times 10^{-2}$ resp. AS

Fermented foods

- 2248 Ahmed (A-H) and Ramanatham (G). Effect of natural fermentation on the functional properties of protein-enriched composite flour. *Journal of Food Science* 53(1); 1988; 218-221

The functional properties of a naturally fermented composite flour (30% edible defatted groundnut flour and 70% sorghum meal) were compared with conventionally fermented sorghum meal. Natural fermentation resulted in the improvement of the water-absorption capacity of the composite flour but decreased its water-retention capacity and its fat absorption capacity. The fermented composite flour showed better foaming capacity and emulsification capacity than fermented sorghum meal. Fermentation helped to stabilize the foaming properties of composite flour. A fermented protein enriched flour composed of sorghum and edible groundnut flour possessed better functional properties relevant to Sudanese traditional fermented preparations. BV

Bacteria

Aeromonas hydrophila

- 2249 Alur (MD), Nerkar (DP) and Vengopal (V). Growth and protease secretion by spoilage bacteria. Influence of nitrogen fractions of proteinaceous foods on *Aeromonas hydrophila*. *Journal of Food Science* 53(1); 1988; 243-246

Sarcoplasmic protein fraction isolated from fish supported growth and secretion of proteases by *Aeromonas hydrophila* under aerobic conditions. This effect could be reversed by supplementation with fish myosin, casein or bovine serum albumin. Resulting cells of the bacterium suspended in membrane-filtered sarcoplasmic protein fraction or phosphate buffer (0.01M, pH 7.5) secreted protease and aminopeptidase in the presence of proteins such as myosin, casein or BAS. The results suggest that apart from the sarcoplasmic protein fractions,

structural proteins of muscle and milk could also influence growth and protease secretion by *A. hydrophila*. AS

Clostridium perfringens

- 2250 Hoskins (CB) and Davidson (PM). Recovery of *Clostridium perfringens* from food samples using oxygen reducing membrane fraction. *Journal of Food Protection* 51(3); 1988; 187-191

Staphylococcus aureus.

- 2251 Khalil (H) and Villota (R). Comparative study on injury and recovery of *Staphylococcus aureus* using microwaves and conventional heating. *Journal of Food Protection* 51(3); 1988; 181-186

Cells of *Staphylococcus aureus* FRI-100 were exposed to a sublethal temp. of 50 °C for 30 min in 0.1 M. phosphate buffer using either microwave energy or a conventional heating source. Following thermal stress, cells were allowed to recover. Injury was monitored as the difference between cell counts when an inoculum from the recovering cells was plated on TSA and TSAS. Total viable population following either heat treatment was 10^6 cells/ml as indicated by TSA counts. When the same suspensions were plated on TSAS a viable count of 1.7×10^3 cells/ml resulted from conventional heating compared with 5.6×10^2 cells/ml following microwave irradiation. Greater membrane damage was sustained by the microwave-heated cells judging by the release of 260-nm absorbing intracellular substances. In addition, the microwave-heated cells regained their enterotoxin synthesis ability at a slower rate following recovery as judged by equal counts on TSA and TSAS. Microwave heating also exerted less injurious effects on *S. aureus* when carried out anaerobically. AS

Streptococcus thermophilus

- 2252 Hutkins (RW) and Morris (HA). Carbohydrate metabolism by *Streptococcus thermophilus*. A review. *Journal of Food Protection* 50(10); 1987; 876-884

Fungi

- 2253 Ravji (RG), Rodriguez (SB) and Thornton (RJ). Glycerol production by four common grape molds. *American Journal of Enology and Viticulture* 39(1); 1988; 77-82

The production of glycerol by the grape molds *Aspergillus niger*, *Penicillium italicum*, *Rhizopus nigricans*, and *Botrytis cinerea* grown in juice from Golden Chasselas and Black Hamburg grapes was examined. Juice from both free-run and homogenized whole berries was used together with different air relations and an incubation temp. of 25 °C. Samples were taken periodically for analysis of glycerol by HPLC, and the mycelial dry wt. of all cultures were determined after 26 to 29-day incubations. Large differences in glycerol production were observed among the molds. *R. nigricans* and *B. cinerea* produced more glycerol than *A. niger* and *P. italicum* under all conditions of

cultivation *B. cinerea* produced more mycelial mass than the other three molds under all conditions except in Black Hamburg juice under "anaerobic" conditions. AS

Mushrooms

- 2254 Breton (C), Thanh (LP) and Paraf (A). Immunochemical identification and quantification of ovalbumin additive in canned mushrooms. *Journal of Food Science* 53(1); 1988; 226-230

This paper presents immunoblotting and ELISA procedures developed for qualitative and quantitative measurements of ovalbumin. A quantitative extraction method was designed to selectively extract ovalbumin from a heated mixture of mushroom and ovalbumin. BV

Yeasts

- 2255 El-Samragy (YA), Chen (JH) and Zall (RR). Amino acid and mineral profile of yeast biomass produced from fermentation of Cheddar whey permeate. *Process Biochemistry* 23(1); 1988; 28-30

This study contributes additional information about biomass produced from whey permeate using selected lactose fermenting yeasts. This biomass was also evaluated for its amino acid, protein and mineral content. The six different microorganisms used in this study were *Saccharomyces fragilis*, *Kluyveromyces marxianus* var. *Marxianus* ATCC 28244, *Candida tropicalis* ATCC 20401, *Candida albicans* ATCC 20402, *Candida utilis* ATCC 9226, *Candida utilis* ATCC 9950 and these were cultured in shake flasks using Cheddar cheese whey permeate as the fermentation medium. The pH and temp. maintained were 5 and 32 °C resp. The harvested biomass after five days of fermentation when analysed showed high protein 30-40, 25% with a variation among the species and a favourable amino acid profile except methionine and cystine. This protein was found to be suitable for food and feed. The minerals are high (9.27-10.38%) NGKR

- 2256 Jermini (MFG) and Schmidt-Lorenz (W). Heat resistance of vegetative cells and asci of two *Zygosaccharomyces* yeasts in broths at different water activity values. *Journal of Food Protection* 50(10); 1987; 835-841

The influence of water activity on the heat resistance of osmo-tolerant yeasts was studied. Vegetative cells, prepared in two different ways, and asci of *Zygosaccharomyces rouxii* and *Z. bailii*, were used. Glucose was adopted as the solute in the heating broth because of its widespread use as humectant in foods. The asci of *Z. bailii* LMZ 108 was observed to have highest heat resistance while that of *Z. rouxii* LMZ 100 showed lower heat resistance. At water activity 0.963, the heat resistance of asci was higher than that of corresponding vegetative cells. However, the lower the water activity of the heating broth, the smaller the difference of asci and vegetative cells. Again, different preparations, of the same cell material lead to different heat resistances. MVG

- 2257 Ryan (E) and Ward (OP). The application of lytic enzymes from *Basidiomycete* *aphyllophorales* in production of yeast extract. *Process Biochemistry* 23(1); 1988; 12-16

In this investigation the effect of *B. aphylophorales* Beta-1, 3-glucanase on yeast autolysis and its mode of action on laminarin and yeast glucan has been compared with the actions of two other enzyme preparations. The results showed that the Beta-1, 3-glucanase of *Basidiomycete aphylophorales* exhibited unusually high yeast lytic activity. When used in combination with papain in yeast autolysis 90-95% of the yeast dry wt. was solubilised. In comparative studies involving three Beta-1, 3-glucanases, laminarinase activity did not correlate well with yeast lytic activity. The pattern of action of the Beta-1, 3-glucanase of *B. aphylophorales* on isolated yeast glucan was characterised by a high initial rate of production of laminaribiose. NGKR

Hygiene

Escherichia coli

- 2258 Moberg (LJ), Wagner (MK) and KellenLA). Fluorogenic assay for rapid detection of *Escherichia coli* in chilled and frozen foods. Collaborative study. *Journal of the Association of Official Analytical Chemists* 71(3); 1988; 589-602

A collaborative study was conducted to compare a proposed LST MUG method with the AOAC official method for *Escherichia coli* detection. *E. coli* produces an enzyme Beta-glucuronidase, which cleaves the substrate, 4-methyl-umbelliferyl-Beta-D-glucuronide (MUG), to yield a fluorescent end product. Incorporation of the MUG substrate into lauryl tryptose broth (LST) enables a rapid quantitative method for screening *E. coli* which is detected by fluorescence of the medium under longwave UV light. In this collaborative study, 5 food samples 2 frozen (entree sauce/gravy and dairy topping) and 3 chilled (hamburger, pork sausage, and cheese), were tested for *E. coli* detection by 17 collaborating laboratories. Results indicate that the LST-MUG method is equal to or better than the current AOAC method for detecting *E. coli*. The LST-MUG method has been adopted official first action. AS

BIOTECHNOLOGY

- 2259 Cowan (CT) and Thomas (CR). Materials of construction in the biological process industries. *Process Biochemistry* 23(1); 1988; 5-11

This review discusses the use and limitations of materials common in the biological process industries. Because of their strength and corrosion resistance stainless steels are the dominant materials. Many traditional materials have been or are being replaced by stainless steels and plastics. NGKR

- 2260 Frode (M). Biotechnological aspects of the dairy and fat industry. *Lebensmittelindustrie* 34(6); 1987; 278-280

Possibilities and problems of the application of the biotechnology in dairy industry and in the edible fat and oil industries are discussed. Also covered are the application of the cell culture technique, the fat extraction from microorganisms and the industrial utilization of lipase. BV

- 2261 Kretschmer (B). The sugar beet-suitable raw material for biotechnology. *Lebensmittelindustrie* 34(6); 1987; 274-276 (De).

- 2262 Luck (HB). Nuclear track membranes and possibilities of their application in food technology and biotechnology. *Lebensmittelindustrie* 34(6); 1987; 252-254 (De).

The nuclear track membranes developed at Kentralinstitut fur Kernforschung Rossendorf, as pure surface filters are suitable excellently for dynamic filtration. They can be used in a wide pH range, and they are resistant against all cleaning agents applied in the food industry. BV

- 2263 Raeuber (HJ), Dittler (B), Gebert (E) and Roschke (E). Application of the microscope image analysis for the examination of microorganisms, relevant for biotechnology. *Lebensmittelindustrie* 34(6); 1987; 255-257 (De).

Possibilities and limitations of automatic microscopic image analysis to depict the image properties exactly objectively and reproducibly and characterization of biotechnological processes is explained with reference to lactic acid bacteria of the yoghurt. BV

- 2264 Wang (HY), Lawless (RJ Jr) and Jian-Erlin. Use of membrane oxygenator to increase oxygen transfer capacity of a bioreactor. *Process Biochemistry* 23(1); 1988; 23-27

In this paper the use of a membrane oxygenator with existing bioreactors in fermentation and cell culture processes has been discussed. This paper also describes the use of membrane oxygenator in the Bioprocesses, parametric study of the membrane oxygenation process. Economic analysis of the process using the membrane oxygenator, experimental evaluation using membrane oxygenator in *Bacillus* fermentation are the aspects covered. NGKR

TISSUE CULTURE

- 2265 Venkataraman (LV). Biotechnology in food-new emerging field. Tissue culture, edible oil and newer foods. *Indian Food Industry* 7(1); 1988; 9-11

Biotechnology as a multi disciplinary approach is referred to the concept of new industrial revolution with regard to improve and

tography/mass spectrometry of the TMS derivatives. AS

- 2342 Guelfi (R). Critical factors in caramel quality. **Manufacturing Confectioner** 68(5); 1988; 111-114

The basis for production of consistent caramel to a predetermined product design has been discussed. The properties of caramel which must be controlled to achieve consistent quality have been developed and defined. In sights and mechanisms to allow effective control through design formulation and process have been thoroughly discussed. The effects of various ingredients and processing conditions on the quality of caramel are discussed. SYR

- 2343 Lees (R). Problem identification in enrobing operations. **Manufacturing Confectioner** 68(5); 1988; 89-99

The article described the problems encountered during enrobing with chocolate or other confectionery based material, the methods to control these difficulties and the procedures to overcome those problems. Successful enrobing production depends on technological control, careful specification of raw materials, use of effective operating techniques, setting fixed performance standards, maintaining accurate weight control, and undertaking close and precise quality control. SYR

Honey

- 2344 Schlueter (J). Updated technologies in honey-combing. **Manufacturing Confectioner** 68(5); 1988; 115-117

One of the specialities in sugar confectionery is the manufacturing of sheeted, laminated or honey-combed sweets. The process of preparing these sweets is described. The stages of processing include cooking, aeration or pulling, jacketing, addition of center filling and slinging of center and jacketing. SYR

- 2345 Taccheo (MB), De Paoli (M) and Spessotto). Determination of total amitraz residue in honey by electron capture capillary gas chromatography-A simplified method. **Pesticide Science** 23(1); 1988; 59-64

A gas chromatographic method using a capillary column is described for the detn. of total amitraz residue in honey samples. The method consists of a preliminary extraction of the sample, an alkaline hydrolysis, an extraction of the 2,4-dimethylaniline formed, without the aid of steam distillation/continuous extraction, its derivatization with heptafluorobutyric anhydride and a gas chromatographic detn. using an electron capture detector. The method is very rapid and can be carried out in a test tube. The detection limit is 0.020 mg kg⁻¹ and recoveries are of the order of 85%. AS

FOOD ADDITIVES

increase the food supply in our country by taking advantage of the microbes and cells taken from plants and animals and their ability to synthesize a wide range of valuable substances. For this, tissue culture plays a greater role in terms of augmenting the storage of edible oil and improving the quality of raw materials, development of newer foods like microbial proteins and oil. GP

Antioxidants

- 2266 Larson (RA). The antioxidants of higher plants. *Phytochemistry* 27(4): 1988; 969-978

Many enzymes and secondary compounds of higher plants have been demonstrated in *in vitro* exp. to protect against oxidative damage by inhibiting or quenching free radicals and reactive oxygen species. The roles of many other compounds as potential antioxidants can be inferred by their similarity to synthetic antioxidants of related structure. The evidence supports at least a partial antioxidant role *in vitro* for many classes of plant metabolites. AS

Preservatives

Antimicrobials

- 2267 Boyle (DL), Sofor (JN) and Maga (JA). Inhibition of spoilage and pathogenic microorganisms by liquid smoke from various woods. *Lebensmittel-Wissenschaft und -Technologie* 21(1): 1988; 54-48

The antimicrobial activity of smoke condensates from 20 different woods (redwood, hard maple, hickory, white oak, ponderosa bark, pencil cedar, chestnut etc.) was tested in pH-adjusted (6.0) tryptone case soy broth by measuring increases in absorbency (600 nm) during incubation (20-35 °C). Microbial strains tested included *Pseudomonas fragi* ATCC 4973, *Staphylococcus aureus* A100, *Aeromonas hydrophila* B2, and *A. hydrophila* F6. Inhibition varied among types of liquid smokes within a given microbial strain. Sap wood of Douglas fir, however, was the most inhibitory liquid smoke examined. Inhibitory liquid smokes were also derived from aspen, birch, and southern yellow pine, while some of the least inhibitory liquid smokes were from mesquite and lodge pole pine. AS

2268

- Parish (ME) and Carroll (DE). Minimum inhibitory concentration studies of antimicrobial combinations against *Saccharomyces cerevisiae* in a model broth system. *Journal of Food Science* 53(1): 1988; 237-239, 263

Minimum inhibitory concn. (MIC) studies were conducted to observe synergistic, antagonistic or additive effects by combinations of butylparaben, ethanol, potassium sorbate and sodium metabisulfite against growth of two *Saccharomyces cerevisiae* strains (Montachus 522 abd NCBU 76) in yeast nitrogen base-glucose broth at pH 3.30.

acids and 55% benzaldehyde. AS

Sweet cherry

- 2336 Drake (SR), Kupferman (EM) and Fellman (JK). Bing' sweet cherry (*Prunus avium* L.) quality as influenced by wax coatings and storage temperature. *Journal of Food Science* 53(1); 1988; 124-126, 156

The use of wax coatings on cherry fruit reduced moisture loss during ambient storage, enhanced cuticular diffusive resistance and retarded the incidence of decay. After ambient storage, cherry fruit treated with wax coatings were firmer than the other treatments, but the use of wax did not reduce the incidence of surface pitting, stem discoloration or stem moisture loss. Fruit packed in a poly liner were similar in quality to fruit with wax coatings, but stems on fruit in poly liners had better colour and moisture. Storage temp. control was the best method to maintain high quality fruit. Cherry fruit and stems stored at 0 C were superior to fruit and stems stored at 4.5 C or 10 C in most quality attributes. AS

CONFECTIONERY, STARCH AND SUGAR

- 2337 Minor (JL) and Pettersen (RC). Mass spectrometric method to determine the chain length of oligosaccharides attached to phenolic polymers by nonglycosidic linkages. *Journal of Agricultural and Food Chemistry* 35(6); 1987; 993-996

In many plants, a portion of the polysaccharides appears to have a very low degree of cross-linking with aromatic polymers such as lignin or flavonols. The proportion of cross-linked units may be enriched for study by enzymatically hydrolyzing the nonbonded carbohydrates. A convenient method is described for the simultaneous analysis of sugar content and apparent chain length of the oligosaccharidic fragments remaining after enzymatic hydrolysis. The hemiacetal ends of the oligosaccharidic fragments are reduced with sodium borohydride while the fragments are still attached to the phenolic polymer. After acid hydrolysis, monomeric sugars are reduced with sodium borodeuteride. The mixed isotopic products are analyzed as their alditol acetate derivatives by capillary GC/MS with selected ion monitoring. The isotopic ratioing procedure is detailed and the precision determined. The method is accurate to 1 monomeric unit for oligosaccharide chain lengths of less than 10. AS

Confectionery

- 2338 Bigalli (GL), Houseal (RDJr) and Eichelberger (D). Practical aspects of the eutectic effect on confectionery fats and their mixtures. *Manufacturing Confectioner* 68(5); 1988; 65-66, 68, 70, 79-80

One important consideration is the interaction and compatibility of the fats that are used in the formulation and their resultant which is the amount of solids at a given temp. This presentation deals with

practical observations of this physical behaviour and how the solid/liquid rate is affected when two fats are mixed by design or by accidental interaction. The compatability of various speciality fats with concentrated butter is described by means of determining % solids at various temp. of the mixtures. The study of % solids is very useful information in the development of products and understanding of the behaviour of confectionery during storage or transportation. SYR

- 339 Prescott (J). Trends in the confectionery industry. *Manufacturing Confectioner* 68(4); 1988; 79-82

It is a general article on trends in the confectionery industry. By having right products in the right places at the right prices, remarkable sales results can be generated for the retailers and for the distributors. People who keep pumping fresh ideas, innovative new products and packaging, and attention getting advertisements and promotions into the confectionery industry. Categories that distributors had developed or left to other classes of trade are now growth areas for confections sales, packaged goods, seasonal products, fund-raising bars and an array of confectionery related products such as nuts cookies and crackers, meat snacks and other snack foods. SYR

Candy

- 2340 Vink (WVW). Dextran in hard candy. *Manufacturing Confectioner* 68(5); 1988; 83-86

Dextran affects both the viscosity of the hard candy in the molten state and the ratio of plasticity to elasticity of the candy so that when the candy is tableted it does not hold its shape. The resulting tablet shrinks in diameter and increased in thickness. It was stated that the problem has been associated with the source of raw sugar and harvesting of cane. Dextran occurs when *Lenconostoc* infects the sugar juice and produces high mol. wt. polysaccharide as a by product of its metabolism. Apparently there is no dextran in beet sugar. SYR

Chocolates

- 2341 Castle (L), Cloke (HR), Startin (JR) and Gilbert (J). Gas chromatographic determination of monoethylene glycol and diethylene glycol in chocolate packaged in regenerated cellulose film. *Journal of the Association of Official Analytical Chemists* 71(3); 1988; 499-502

A method for the quantitative detn. of monoethylene glycol (MEG) and diethylene glycol (DEG) in chocolate is described. The procedure involves dissolving the chocolate in hot water, defatting with hexane, removing sugars by precipitation, and analyzing as trimethylsilyl (TMS) ether derivatives by capillary gas chromatography. The use of butan-1, 4-diol as an internal standard corrects for recovery, which is between 50 and 60% to give a relative standard deviation of 10-11% for the detn. of both glycols at the level of 50 mg/kg. The presence of MEG and DEG in chocolate is confirmed by full scanning gas chroma-

no effect on desorption rate. The concn. and persistence of residue was dependent on two parameters of the fumigation: the load factor which is the ratio of the vol. of cherries to the vol. of the fumigation chamber and the pulp temp. of the cherries. The relationship between load factor, pulp temp. and desorption rate was used to derive a mathematical model of the desorption of methyl bromide from cherries. The model gave good estimates of residue concn. over a wide range of load factors, pulp temp. and aeration periods, and was used to predict the length of the aeration period required to reduce the residue to a proposed tolerance of 0.1 mg g^{-1} . SGB

Grapes

- 2329 Bidochka (MJ), Selinger (LB) and Khachatourians (GG). A *Bacillus thuringiensis* isolate found on grapes imported from California. *Journal of Food Protection* 50(10); 1987; 857-858

Occurrence of bacteria on samples of transported fruit and vegetable products and use of plasmid profile analysis to identify the same were studied. From 'Red Tokay' grapes imported from California was found to contain a gram-positive, sporogenous, crystalliferous bacterium which was identified as *Bacillus thuringiensis* var. *Kurstaki* on the basis of plasmid profiles resolved by agar gel electrophoresis. MVG

- 2330 Hang (YD). Recovery of food ingredients from grape pomace. *Process Biochemistry* 23(1); 1988; 2-4

The review covers various aspects of using grape pomace as a raw material for the production of a var. of food ingredients. This describes characteristics of grape pomace, recovery of food ingredients and promising alternative to current disposal methods. NGKR

- 2331 Razungles (A), Bayonove (CL), Cordonnier (RE) and Sapis (JC). Grape carotenoids. Changes during the maturation period and localization in mature berries. *American Journal of Enology and Viticulture* 39(1); 1988; 44-48

Changes in the contents of four carotenoids during maturation of three var. of *Vitis vinifera* were studied. The possible cause of this trend is discussed. In mature berries, carotenoid levels were higher in skin than in pulp. No carotenoids were detected in juice. MSP

Jackfruits

- 2332 Berry (SK) and Kalra (CL). Chemistry and technology of jack fruit (*Artocarpus heterophyllus*)-a review. *Indian Food Packer* 42(3); 1988; 62-76

The review deals with various aspects of jackfruit including physical characteristics, chemical composition (carbohydrates, protein, vitamins, enzymes flavour and minerals). Processing covers aspects like canning, dehydration beverage, vinegar, pickle, papad, and candied preparations is also covered. The jackfruit seed is dealt

under carbohydrates, protein, lectins, fatty acid composition, seed flour, roasted nuts and the jackfruit rind and pectin jelly. 116 references. VKR

Papayas

- 2333 Cairns (T), Siegmund (EG), Stamp (JJ) and Jacobs (RM). Characterization of benzyl isothiocyanate and phenyl acetonitrile from papayas by mass spectrometry. *Journal of the Association of Official Analytical Chemists* 71(3); 1988; 547-550

Two unidentified analytical responses in a papaya extract were structurally determined by mass spectrometry to be benzyl isothiocyanate and phenyl acetonitrile. Both these compounds have previously been shown to result from degradation of benzylglycosinolate that occurs naturally in the seeds of the fruit. Characterization by mass spectrometry has now provided a convenient mechanism to detect both these degradation compounds in extracts resulting from routine pesticide residue analysis. AS

Persimmon

- 2334 Pesis (E), Levi (A) and Ben-Arie (R). Role of acetaldehyde production in the removal of astringency from persimmon fruits under various modified atmospheres. *Journal of Food Science* 53(1); 1988; 153-156

Astringency of persimmons was removed by enclosing the fruits in polyethylene bags under vacuum or by replacing air with N or carbon dioxide. Acetaldehyde produced by the fruit under these conditions accumulated at different rates. The rate of the deastringency process was directly proportional to the level of acetaldehyde accumulation. Thus, the fruit held at 20 °C in carbon dioxide was the first to lose its astringency, but showed internal browning after 1 wk. Fruits under vacuum or N where less volatiles accumulated, maintained their high quality and firmness for 2 wk at 20 °C or 3 months at -1 °C. However, fruit held under vacuum began to show internal browning when acetaldehyde accumulated above a certain level. AS

Prunes

- 2335 Pan (WD), Chiang (BH) and Chiang (PC). Desalination of the spent brine from pickled prunes processing by electrodialysis. *Journal of Food Science* 53(1); 1988; 134-137, 164

The feasibility of desalting the spent brine from pickled prune processing by electrodialysis was studied. Three membrane pairs were tested and one was selected for the process. The limiting current density increased with increasing fluid velocity as well as increasing salt concn. Increasing current density increased the ion removal rate, the rate of water transport, the power consumption per unit mass of salt removal, and decreased current efficiency. However, the losses of citric acid and benzaldehyde did not increase significantly until the current density was up to 10 mA cm². The electrodialysis process removed 88% salt from the brine while retaining 80% organic

reduced 70%. Treatments with S-(E)-2-amino-4-(2-aminoethoxy)-3 butyric acid (AVG) and ACC indicated that ethanol inhibited ACC conversion to ethylene. AS

FRUITS

Apples

- 2323 Chu (CL). Internal ethylene concentration of 'McIntosh', 'Northern spy', 'Empire', 'Mutsu' and 'Idared' apples during the harvest season. *Journal of the American Society for Horticultural Science* 113(2); 1988; 226-229

The limitation of using internal ethylene concn. as a maturity index is the same required to establish the ethylene curve over the harvest seasons. The curve would be established too late for the grower to use for predicting the proper maturity and harvest date. However, growers and researchers may want to use this technique to confirm the physiological maturity of harvested apples. This confirmation of apple maturity may be useful for estimating and interpreting the storage life of the crop and the possible development of maturity related storage disorders. A gas chromatography method to estimate ethylene in the cone cavity of apples and 3 consecutive years in 5 apple var. is presented. BAP

- 2324 Prabha (TN), Raina (PL) and Patwardhan (MV). Lipid profile of cultured cells of apple (*Malus sylvestris*) and apple tissue. *Journal of Biosciences* 13(1); 1988; 33-38

The potentiality of apple cell cultures to synthesize not only higher quantities of lipids than apple fruit but also different classes of lipids is noted. Total lipid was 15-fold higher in apple callus than in the original tissue. On callusing linoleic acid decreased from 66% to 14% while linolenic acid showed a very large increase from 0.9% to 44%. Stearic and oleic acids also increased in callus. The relative amounts of sterol/hydrocarbon and diglyceride fractions were higher in callus cultures, while apple tissue showed higher levels of triglycerides and sterol. Phosphatidylethanolamine and phosphatidylglycerol seemed to be newly synthesized during callusing while other phospholipids such as lysophosphatidyl choline, lysophosphatidyl ethanolamine, phosphatidylinositol and phosphatidic acid decreased. There was much higher glycolipid in apple callus than in the original tissue. The ratio of neutral lipid to polar lipid was higher in apple than in apple callus. AS

Babaco fruits

- 2325 Bartley (JP). Volatile flavour components in the headspace of the babaco fruit (*Carica pentagonia*). *Journal of Food Science* 53(1); 1988; 138-140

Babaco (*Carica pentagonia*) fruits grown in Australia and New

Zealand were analysed for volatile flavour compounds by concn. of the headspace vapours on Tenax-GC. Thirty - seven components were identified. Aliphatic esters account 84% of the total area with the major constituents being ethylesters of butanoic acid and hexanoic acid (72%). Trapping of the headspace volatiles on Tenax-GC has shown to be a useful method for the analysis of the flavour. BV

Bananas

- 2326 Inoba (A) and Nakamura (R). Numerical expression for estimating the minimum ethylene exposure time necessary to induce ripening in banana fruit. *Journal of the American Society for Horticultural Science* 113(4); 1988; 561-564

A numerical expression for min. treatment time (MTT) for ethylene necessary to induce post-harvest ripening in banana fruit with various parameters like applied ethylene, fruit temp. (tc), content of sugars, organic acids and ACC (amino cyclopropane carboxylic acid) and ethylene forming enzyme (EFE) were measured as fruit variables, and these are correlated in the form of an equation. When calculated by this method the min. treatment time (MTT) for ethylene could be adequately established for the treatment of commercial Japanese banana. BAP

Blackcurrant

- 2327 Bitteur (S) and Rosset (R). Use of an octadecyl-bonded silica and styrene-divinylbenzene copolymer for the recovery of blackcurrant aroma compounds from a food plant waste water. *Journal of Food Science* 53(1); 1988; 141-147

Octadecyl-bonded silica and styrene-divinylbenzene copolymer columns were investigated for the trace enrichment of blackcurrant aroma compounds identified in a food plant effluent. Using a calibration procedure of reversed-phase systems in pure water, recoveries of identified solutes could be predicted for various volumes appeared to be the less distorting extracting material. Experimental yields were almost unaffected by the nature and the volume of the eluting solvent in the range studied. The extracted compounds were practically recovered with ethanol, meeting food processing regulations. AS

Cherries

- 2328 Sell (CR), Klag (NG) and Burditt (AKJr). Methyl bromide residues in fresh cherries. Effects of parameters of fumigation. *Pesticide Science* 23(1); 1988; 41-49

Detn. were made of the desorption rate or residual free methyl bromide from fresh sweet cherries during the aeration period that followed fumigation with methyl bromide. Gas chromatography with electron capture detector was followed for the headspace gas analyses. The results showed that the desorption followed approx. pseudo-first-order kinetics. Ventilation rates during aeration, which were greater than or equal to the rates used at commercial fumigation chambers, had

42(3); 1988; 14-22

Three var. (Punjab-7, Punjab Padmini and EMS-8) of okra (*Abelmoschus esculentus* L.) were assessed for their shelf-life at refrigerated (8-10 °C, RH 85-90%) and ambient (26-34 °C, RH 65-90%) temp. after prepackaging in 200 gauge polypropylene (PP) and low density polyethylene (LDPE) perforated and non-perforated pouches. The okra pods packed in non-perforated PP and LDPE bags and stored remained in good condition as compared to those packed in perforated bags. Pre-packaging in PP bags and storing at room temp. is advantageous for var. EMS-8 upto 6 days. The storage life of var. Punjab Padmini could be increased from 3 to 15 days when prepackaged in unventilated PP bags and stored at refrigerated temp. VKR

- 2317 Kulkarni (SG), Sehgal (RC), Sukhvir Kour, Berry (SK), Kalra (CL), Sharma (BR), Arora (SK). Studies on the evaluation of new okra (*Abelmoschus esculentus* L.) cultivars for dehydration. *Indian Food Packer* 42(3); 1988; 7-13

Seven var. of okra (*Abelmoschus esculentus* L.) (Punjab-7, Punjab Padmini, EMS-8, HR-4, 11 HR-10, Punjab-57, Pusa Sawani) were evaluated for their physico-chemical characteristics and suitability for dehydration. The drying ratio of the var. ranged from 7.5:1 (EMS-8) to 10.3:1 (11 HR-10). The rehydration ratio varied from 1:6.3 (Purbani 57) to 1:7.3 (11 HR-4) in freshly dried okra and it was 1:6.3 to 1:7.0, 1:5.7 to 1:6.9 and 1:5.4 to 1:6.3 in dehydrated okra stored at 13-25 °C during winter and 25-38 °C during other seasons for 1, 3 and 6 months resp. The var. Punjab-7 and EMS-8 followed by Punjab Padmini are the most suitable var. for dehydration and were superior in colour, texture, odour and general appearance of the rehydrated product. VKR

- 2318 Saimbhi (MS), Dhillon (NPS), Randhawa (KS), Arora (K) and Thakur (MR). Evaluation of new okra variety Punjab-7 for processing. *Indian Food Packer* 42(3); 1988; 45-46

The okra (*Abelmoschus esculentus* (L) Moench) var. Punjab-7 was evaluated for dehydration. Punjab-7 has better dehydration ratio (12:1), compared to Pusa Sawani (13.7:1). Sulphur dioxide content was also lower in Punjab-7 (384 p.p.m.) compared to Pusa Sawani (544 p.p.m.). The rehydration ratio was 4.4:1 in Punjab-7 and 4.7:1 in Pusa Sawani. Punjab-7 which also retained better colour on dehydration was considered a better var. for dehydration. KAR

- 2319 Sukhvir Kour, Kalra (CL), Sehgal (RC), Kulkarni (SG), Berry (SK), Arora (SK) and Sharma (BR). Studies on the evaluation of new okra (*Abelmoschus esculentus* L.) cultivars for canning. *Indian Food Packer* 42(3); 1988; 23-31

Okra (*Abelmoschus esculentus* L.) var. (Punjab-7, Punjab Padmini, EMS-8 11 HR-10, Purbani-57, G-2, Pusa Sawani) were assessed for physico-chemical characteristics and suitability for canning. There was no varietal variation in the chemical characteristics of okra var. An appreciable increase in water pick up, decrease in sugars and protein

content was noticed during processing in all the var. The EMS-8 var. was found to be the best for canning followed by Punjab-7, Punjab Padmini and Pusa Sawani on account of good colour, firm texture, low mucilage and good appealing qualities of the product. VKR

- 2320 Thorat (SS), Kadadi (AM), Kulkarni (DN) and Ingla (UM). Preparation and storage studies on intermediate moisture okra. *Indian Food Packer* 42(3); 1988; 47-51

Okra (*Abelmoschus esculentus*) var. Pusa Sawani was evaluated for intermediate moisture and storage performance at room temp. Fresh okra was treated with 5, 7.5 and 10% brine and the changes in chemical constituents (moisture, carbohydrate, pH, chlorophyll and total plate count immediately after treatment and chlorophyll changes in stored sample were determined. The total loss of chlorophyll was 10-12% during blanching and drying. Samples prepared were packed in LDPE, analysed for change in chlorophyll, browning, pH, rehydration ratio and total plate count (TPC) during 40 days storage. Samples treated with 7.5% brine was superior in chlorophyll retention, rehydration ratio; TPC was within the limit for all the samples. Organoleptic qualities of 5% and 7.5% brine treated samples were superior to 10% brine treated samples. VKR

Tomatoes

- 2321 Draughon (FA), Chen (S) and Mundt (JO). Metabiotic association of *Fusarium*, *Alternaria* and *Rhizoctonia* with *Clostridium botulinum* in fresh tomatoes. *Journal of Food Science* 53(1); 1988; 120-123

Growth of *Clostridium sporogenes* and *C. botulinum* and toxin production by *C. botulinum* in a metabiotic relationship with fungi (*Alternaria*, *Rhizoctonia*, and *Fusarium*) in fresh tomatoes were studied. Infection of tomatoes with the fungi increased the pH of tomato tissues as high as pH 8.0. Macerates from tomatoes inoculated with *C. botulinum* and *Alternaria* or *Fusarium* were toxic to mice but *Rhizoctonia* infected tomatoes did not tend to support toxin production by *C. botulinum* even though the pH of infected tomatoes was pH 5.3 to 7.6. BV

- 2322 Saltveit (MEJr) and Mencarelli (F). Inhibition of ethylene synthesis and action in ripening tomato fruit by ethanol vapours. *Journal of the American Society for Horticultural Science* 113(4); 1988; 572-576

Exposure of whole fruit, slices, or pericarp disks of tomato (*Lycopersicon esculentum* Mill.) to 0.5 to 3.0 ml absolute ethanol vaporized in a 4-liter container for 3 h significantly reduced the climacteric rise in carbon dioxide and ethylene production, lycopene synthesis, and chlorophyll loss. Inhibition of ripening occurred whether fruit were at the mature-green or breaker-turning stage. Whole fruit recovered and ripened normally after a delay that was related to the tissue ethanol concn. Treated slices did not ripen normally, and exposure to 16 μ l ethylene /liter did not promote ripening. The level of 1-aminocyclopropane-1-carboxylic acid (ACC) was 14-fold higher in treated slices, while ethylene production was

- 2310 Fleming (HP), McFeeters (RF), Daeschel (MA), Humphries (EG) and Thompson (RL). Fermentation of cucumbers in anaerobic tanks. *Journal of Food Science* 53(1); 1988; 127-133

A procedure was developed and tested for fermentation of cucumbers at low concn. of NaCl in experimental, anaerobic tanks. The procedure included washing of the cucumbers, use of a buffered cover brine composed of 0.045M calcium acetate, sodium chloride to equilibrate at 2.7% or 4.6%, *Lactobacillus plantarum* culture, and N purging to remove dissolved carbon dioxide. The fermentation were predominantly homofermentative, lactic acid accounting for 95% of the cucumber sugars fermented. Firmness retention of the fermented cucumbers during storage for 1 yr was improved by heating packaged products to 69 C before storage, but firmness retention was acceptable in unheated products. AS

Leafy vegetables

Amaranthus

- 2311 Parades-Lopez (O), Mora-Es Bbedo (R) and Ordorica-Falomir (C). Isolation of amaranth proteins *Lebensmittel-Wissenschaft und-Technologie* 21(1); 1988; 59-61

The use of whole and defatted amaranth flours for protein isolation is described. Extraction of proteins at pH 11 with NaOH and isoelectric precipitation between pH 4.5 and 5.5 with HCl gave the highest recoveries for both flours. Yields of salt-soluble proteins increased upon increasing the NaCl concn. to 0.8 -1M. Protein fractionation by an Osborne-modified procedure gave for both flours 46-49% albumins + globulins, 1-3% prolamins, and 30-33% glutelins. Albumins/globulins ratios, determined after dialysis, were about 2 and 1.7 for whole and defatted flours, resp. Glutelins were the abundant protein class in both flours. AS

Celery

- 2312 Smith (RB) and Reyes (AA). Controlled atmosphere storage of Ontario-grown celery. *Journal of the American Society for Horticultural Science* 113(3); 1988; 390-394

Total wt. loss of < 10% over a 10 wk. period was achieved by storing celery in atm. containing 1% oxygen combined with 2% or 4% carbon dioxide at 0 C. Significant increase in marketable celery resulted when ethylene was scrubbed from some atm. A combination of 1% or 2% oxygen and 2% or 4% carbon dioxide prevented black stem development during the storage period. Improved visual colour, appearance flavour, and increased marketable celery justifies the use of 4% carbon dioxide in celery storages. AS

- 2313 Willis (CA) and Teixeira (AA). Controlled reduction of water activity in celery. Effect on membrane integrity and biophysical properties. *Journal of Food Science* 53(1); 1988; 111-116

Experiments were designed and executed to identify the mechanism responsible for irreversible texture changes in dehydrated and rehydrated celery tissue. Results showed that these changes remained reversible as long as dehydration did not reduce water activity below 0.987. Water removal below this level resulted in a partial irreversible loss of rigidity as measured by modulus of elasticity. Correlation of chemical and physical data with electron-micrographs of tissue ultrastructure suggested that expansion induced lysis of the plasma and tonoplast membranes during rehydration was the responsible mechanism when tissue samples were dehydrated to water activity between 0.920 and 0.987. At very low water activity (0.25), samples showed a total loss of rigidity that correlated with observed damage to cell walls. AS

Okra

- 2314 Bajaj (KL), Kaur (PP) and Arora (SK). Varietal variation in the chemical constituents of okra (*Abelmoschus esculentus* (L.) Moench). Indian Food Packer 42(3); 1988; 32-36

The okra (*Abelmoschus esculentus* L. Moench) var. (Pusa Sawani, P-7, G-2, Pb-57, Punjab Padmini, 11 HR-10, 11 HR-4, EMS-10, Pusa Mukhmali, Sel-2) were analysed for chemical constituents. Max. dry matter was found in the var. P-7 (11.94%). Mucilage content was optimum in var. P-7 and Pusa Sawani whereas 11 HR-10 (0.24%) had low and G-2, Sel-2 and Punjab Padmini had high mucilage content. Crude fibre content on fresh wt. basis varied from 0.83% (EMS-10) to 1.15% (Punjab Padmini). Max. crude protein was found in Pb-57 (2.12%) followed by P-7 (2.09%). Total phenols varied from 0.55% (Sel-2) to 0.93% (11 HR-10) and flavonols (mg/100g) from 36.4 (Sel-2) to 66.84 (Pb-57). Fe, P, Ca contents were max. in Pb-57 (3.6 mg/100g), Pusa Makhmali (62.0mg/100 g) and G-2 (87.0 mg/100 g) resp. VKR

- 2315 Bhupinder Kaur and Bains (GS). Studies on the physical characteristics of local varieties of fresh okra (*Hibiscus esculentus* L.) cultivars of different maturities available in Northern India. Indian Food Packer 42(3); 1988; 37-44

The physical characteristics of North Indian Okra (*Abelmoschus esculentus* L.) var. Pusa Sawani and Punjab Padmini at different maturities were studied. Considerable differences were observed in wt., mean length and girth of pods of each var. at different stages of maturity. The texture of the pods was examined 1-9 days of maturity; the tender pods of one day maturity beared less force when compressed compared to that of 2-5 days old pods. About 3 time more deformation forces was needed for the large and medium maturity whole pods whereas the differences was less conspicuous in smaller whole pods kept under refrigeration. Based on the moisture content it was found that the large and medium pods of Pusa Sawani was more succulent, as it contained more moisture (6.7%) compared to Punjab Padmini. KAR

- 2316 Kalra (CL), Kulkarni (SG), Sukhvir Kour, Sehgal (RC), Berry (SK), Sharma (BR), Arora (SK). Studies on the post-harvest storage of fresh okra cultivars as influenced by pre-packaging. Indian Food Packer

Technologie 21(1); 1988; 62-65

Potatoes with various solids contents were used to produce potato chips and the products analysed to determine yield, moisture content and oil content. Use of high (> 23%) solids content tubers gave increased yield and reduced oil content products. A products hydrometer gave a better indication of oil content than brine graded samples. AS

- 2304 Garrote (RL), Silva (ER) and Bertone (RA). Blanching of small whole potatoes in boiling water and by electro-conductive heating. *Lebensmittel-Wissenschaft und-Technologie* 21(1); 1988; 41-45

Small whole potatoes were blanched in boiling water or by electro-conductive heating or by a combination of both methods, to determine heat penetration and distribution of peroxidase inactivation. Treatments consisted of heating potatoes with boiling water for 4, 8, 12 and 16 min, with electro-conductive energy for 15, 30, 45, 60 and 75 sec or with the following combinations, electro-conductive heating for 30, 45 or 60 sec followed by boiling water for 1, 2 and 3 min. Temp. measurements were made at depths of 4, 11 and 20 mm using tubers with a mean radius of 20 mm. Peroxidase inactivation was measured in three potato locations and in the whole potato. Heat transfer in boiling water was by unsteady conduction from the outside, whereas by electro-conductive heating potato became hot first in the center with a heat gradient developing toward the periphery. Twelve min. in boiling water practically inactivated peroxidase in whole potato; 75 sec in electro-conductive energy produced a similar effect. The combination 45 sec electro-conductive heating followed by 3 min in boiling water produced an important peroxidase inactivation while preserving potato tissue structural integrity. AS

- 2305 Gorinstein (S), Yamagata (S) and Hadziyev (D). Amino acid composition and its change in raw and granulated potatoes during processing. *Journal of Food Science* 53(1); 1988; 308-309

The granule process had little effect on the total amino acid and their composition. Processing potatoes into dehydrated granules by the freeze thaw process caused only small losses in total amino acids and little change in their composition. Only a 4.5% destruction of essential amino acids and a total loss of 2.1% of non-essential amino acids, excluding aspartic and glutamic acids which comprised 48% of peeled and sliced potatoes. BV

Vegetables

- 2306 Andersson (RE). Biogenic amines in lactic acid-fermented vegetables. *Lebensmittel-Wissenschaft und-Technologie* 21(1); 1988; 68-69

Lactic acid-fermented vegetables and root crops were analysed with respect to biogenic amines. Cadaverine, histamine, putrescine, spermidine and tyramine were found in concn. ranging from 1 to 15 mg/kg of product. Dimethylamine, tryptamine, phenylethylamine and spermine were not detected at all in any of the products. Since all

the amines found were present in concn. considerably lower than those known to cause food poisoning, lactic acid-fermented vegetables and root crops should be considered as low-risk products with regard to the presence of biogenic amines. AS

7 Mishra (D) and Rath (GC). In vitro evaluation of chemicals against *Fusarium* spp. causing post harvest decay of vegetables. *Pesticides* 22(2); 1988; 44-47

Bavistin, Benlate Tecto-60, BAS 3050F, HMP, MBC and Panogess-15 were found to be effective (< 15 mg/l) in inhibiting the mycelial growth of the 4 sp. of *Fusarium* viz. *F. oxysporum*, *F. solani*, *F. moniliforme* and *F. equiseti* causing post harvest decay of vegetables. NGKK

Brinjal

08 Berry (SK), Kalra (CL), Beerh (OP), Kulkarni (SG), Kour (S), Sehgal (RC) and Chadha (ML). Screening of different varieties of brinjal (*Solanum melongena* Linn.) for preparation and canning of Bharta. *Indian Food Packer* 42(3); 1988; 52-61

Brinjal (*Solanum melongena* Linn.) var. (BR-11, Pb-8, Punjab Jamuni Gola, Round Green Sel, T-3) were evaluated for their suitability to yield Bharta (a commonly relished curried preparation). With respect to the colour, aroma, taste, mouthfeel, the Bharts containing 30% tomatoes, 30% onions, 1.5% ginger, 1.2% salt, 0.2% chilli powder and 8% refined groundnut oil was found optimum. Bharta prepared from var. Round Green Sel was superior with respect to colour, aroma, taste, mouthfeel and overall quality during the entire six months of storage period, although Bharta prepared from all the var. were acceptable. VKR

Cucumbers

309 Buescher (RW) and Burgin (C). Effect of calcium chloride and alum on fermentation, desalting, and firmness retention of cucumber pickles. *Journal of Food Science* 53(1); 1988; 296-297

Results of this study indicate that the fermentation and desalting were unaffected by calcium chloride treatment of fermentation brines. However, exposure of pickles to calcium chloride during fermentation and brine storage substantially reduced softening after processing. Post-desalting treatment with alum and/or calcium chloride of pickles not previously exposed to calcium chloride after desalting. This indicates that pickle manufacturers should use calcium chloride in fermentation and storage brines containing calcium chloride and treated with alum or calcium chloride after desalting. This indicates that pickle manufacturers should use calcium chloride in fermentation and storage brines, and post desalting treatments with either alum or calcium chloride should be included to maintain firmness during storage of the processed product. BV

Protein isolates were prepared from water extracts of defatted soybean flour or flakes by acid precipitation at pH's from 3.5 to 5.2 with or without added 0.1 N NaCl. The resulting wheys and precipitates were analyzed for trypsin inhibitor (TI) activity (TIA), phytic acid, and minerals. TIA varied from 70 mg of trypsin inhibitor/g of protein in an isolate precipitated at pH 4.5 from an extract with no added NaCl to 8 mg/g at pH 5.2 with added NaCl. Protein isolate yields varied from 85% of extract proteins at pH 4.5 with no added salt to 59% at pH 5.2 with added salt. The TIA was concentrated to 450 mg/g of freeze-dried permeate by ultrafiltration and dialysis. Retention of the TIA was 50% or more by an ultrafiltration membrane with a 100-kDa cutoff. Since TI's have a mol. wt. of 20 K or less, their retention indicates that they were aggregated to a higher mol. wt. The phytic acid level was highest and zinc level lowest in the pH 3.5 protein precipitate compared to levels in the pH 4.5 and 5.2 precipitates. Levels of Ca, Mg, K, Na, Fe, Mn, and Cu in isolates, wheys, and a TI conc. were also determined. Extent of removal of minerals and phytic acid from an acid-soluble TI concentrate at pH 2.4 was in the order K > Mn > Zn > Mg > phytic acid > P > Ca > Fe > Cu. AS

- 2298 Kiosseoglou (V) and Doxastakis (G). The emulsification properties of soybean protein in the presence of polysaccharides. *Lebensmittel-Wissenschaft und-Technologie* 21(1); 1988; 33-35

The influence of ionic and non-ionic polysaccharide addition on the emulsion formation and stabilization properties of soybean protein has been studied. It was observed that the presence of polysaccharide molecules in the continuous phase of the emulsions resulted in a decrease of their initial drop size and an improvement of their stability compared to control samples, irrespective of whether there was polysaccharide-protein interaction or not. The influence of polysaccharide addition was attributed to the increase in the continuous phase viscosity. AS

- 2299 McDaniel (MR) and Chan (N). Masking of soy protein flavour by tomato sauce. *Journal of Food Science* 53(1); 1988; 93-96, 101

Flavour interaction in a model system consisting of 5% (W/W) soy protein in a series of tomato sauces containing 55-100% commercial tomato paste was evaluated by six trained panelists. Intensities of the tomato flavours were found to increase with tomato concn. The combination of the soy and tomato components resulted in the repression of the bitter, harsh and astringent tomato flavours, and significantly reduced the overall flavour and acidic intensities of the tomato component. Individual odours and flavours of the soy protein became indistinguishable in soy/tomato mixtures. There was a substantial reduction in the overall soy odour, flavour and aftertaste with the increase in tomato concn. AS

- 2300 Tan-Wilson (AL), Chen (JC), Duggan (MC), Chapman (C), Obach (RS) and Wilson (KA). Soybean Bowman-Birk trypsin isoinhibitors. Classification and report of a glycine-rich trypsin inhibitor class. *Journal of Agri-*

cultural and Food Chemistry 35(6); 1987; 974-981

Ten soybean Bowman-Brik trypsin isoinhibitors have been purified from soybean seed, *Glycine max* (L.) Merr. In order decreasing mobility in the Davis PAGE system, they are BBSTI-E', BBSTI-E, BBSTI-D', BBSTI-C', BBSTI-C, BBSTI-B' BBSTI-B, BBSTI-A", BBSTI-A', and BBSTI-A. We assign the classical Bowman-Brik soybean trypsin inhibitor, BBSTI-E; its carboxyl-terminal proteolytic derivative, BBSTI-D; and a related BBSTI-E' to subgroup I. Subgroup II consists of BBSTI-C', -C, and -A", which correspond to known homologous inhibitors in soybeans. BBSTI-B' and BBSTI-B are in subgroup III. All inhibitors in these three subgroups have 70-80 residues with high half-cystine and low glycine contents. Subgroup IV inhibitors, BBSTI-A and BBSTI-A', cross-react with anti-BBSTI-E antibodies. However, they are 3 times larger, have low half-cystine and high glycine contents, and do not appear to resemble the Bowman-Brik, the Kunitz, or the wound induced proteinase inhibitors. While the cystine-rich inhibitors are predominant in cotyledon, the glycine-rich inhibitors are the major forms in the vegetative tissues of the seedling. AS

- 2301 Thompson (DB) and Fosmire (GJ). Determination of zinc bioavailability from soy protein concentrates by slope-ratio analysis. *Journal of Food Science* 53(1); 1988; 204-207

Soy protein conc. were made by 60% ethanol leaching (EC) and hot water leaching (WC), resulting in phytate-to-Zn molar-ratios of 52 and 23 resp. Zn bioavailability was determined by a slope-ratio assay. Varied dietary Zn levels were achieved by either zinc carbonate, or soy conc. addition to an egg albumin diet. For wt. gain, slope ratios relative to zinc carbonate were 0.67 ($P < 0.001$) for EC and 0.81 ($P < 0.01$) for WC. Zn bioavailability was higher for WC than for EC (slope-ratio of 0.82, ($P < 0.05$)). For log tibia Zn, slope -ratios relative to zinc carbonate were 0.36 ($P < 0.001$) for EC and 0.57 ($P < 0.01$) for WC. The appropriateness of the slope-ratio assay for Zn sources of differing bioavailabilities is discussed. AS

TUBERS AND VEGETABLES

Root vegetables

Beet root

- 2302 Pourrat (A), Lejeune (B), Grand (A) and Pourrat (H). Betalains assay of fermented red beet root extract by high performance liquid chromatography. *Journal of Food Science* 53(1); 1988; 294-295

Tubers

Potatoes

- 2303 Gamble (MH) and Rice (P). Effect of initial tuber solids content on final oil content of potato chips. *Lebensmittel-Wissenschaft und-*

tion of the GLC column and the cleanness of the injection port were found to be crucial for quantitative detn. of the glucosinolate silyl ethers. The relative stabilities of glucosinolate silyl ethers in pyridine solution remained constant over a period of wks in air at ambient temp. AS

Soybeans

- 2291 Prandon (DL), Bates (AH) and Friedman (M). Enzyme-linked immunoassay of soybean Kunitz trypsin inhibitor using monoclonal antibodies. *Journal of Food Science* 53(1); 1988; 102-106

A new monoclonal antibody-based immunoassay was developed which can measure low levels of the soybean Kunitz trypsin inhibitor in processed soy products such as infant formulas and could also be used to study the expression and regulation of the gene which encodes this protease inhibitor. BV

- 2292 Ostergaard Alsoe (K) and Adler-Nissen (J). Thermal denaturation of lipoxygenase, from soybeans in the presence of its natural substrate. *Lebensmittel-Wissenschaft und-Technologie* 21(1); 1988; 8-12

Crude extracts of soybeans were heated in capillary tubes and residual lipoxygenase activity was determined by the polarographic method under conditions favouring activity of the iso-enzyme lipoxygenase-1. The rate of inactivation and the energy of activation for the denaturation reaction of lipoxygenase were determined for various concn. of soybean extract. In the examined range of concn. no significant effect was found on the energy of activation, but a considerable lowering of the rate of denaturation of lipoxygenase was observed when increasing the concn. of soybean solids. A mathematical model for the inactivation rate as a function of concn. of soybean solids is established. AS

- 2293 Weaver (CM), Davis (J), Marks (HS) and Sensmeier (RK). Selenium content of processed soybeans. *Journal of Food Science* 53(1); 1988; 300-301

Analysis for Se and total se in processed full fat soy flour (a defatted soy flour) and an acid-precipitated high protein concn., showed that se concn. was dependent on the protein levels of the processed fractions indicating that the major portion of Se in soybeans is incorporated in proteins. BV

Soy flour

- 2294 Meena Tandon (M) and Gurmukh Singh. Effect of addition of defatted soy flour on physicochemical characteristics and acceptability of a traditional savoury "urd barian". *Indian Journal of Nutrition and Dietetics* 24(11); 1987; 346-352

The effect of addition of defatted soy flour on the quality characteristics and acceptability of urd barian which is prepared out of dried balls of urd paste with pumpkin and spices and commonly used

in vegetable curry preparations in U.P., Punjab, Haryana States (India) has been studied. Defatted soy flour was added at 5, 10, 20, 25, and 30% levels. With the increase in the level of soy flour the % protein, ash and crude fibre of barian increased whereas the crude fat and carbohydrates decreased. The barian became darker and the nonenzymatic browning increased with increasing proportion of defatted soy flour. Due to the hard texture the rehydration of barian was poor and addition of defatted soyflour upto 15% did not affect the overall acceptability of barian. NGKR

Soy products

Tofu

- 2295 Jeng (C-Y), Ockerman (HW), Cahill (VR) and Peng (AC). Influence of substituting two levels of tofu for fat in a cooked comminuted meat-type product. *Journal of Food Science* 53(1); 1988; 97-101

Tofu (15.5% and 31.6%) was used to substitute primarily for fat, and were compared with soy protein conc. (SPC) (3.5% level) and an all-meat (control). The raw batter emulsion analysis indicated significant differences ($P < 0.05$) among tofu, SPC and control treatments for pH, water holding capacity and emulsifying capacity. Tofu added bologna treatment resulted in the highest emulsifying capacity of raw batter, the least yield, and the lowest calories. The 31.6% tofu-added bologna had the firmest texture, less moisture stability, and lower fat than SPC-containing bologna and all-meat control; the SPC-containing bologna had more beany flavour and was less tough. Results suggests that tofu has a potential of being a good meat additive for emulsion meat products. This can significantly reduce the fat and calorie level if substituted for fat in a meat emulsion product. BV

- 2296 Poneros (AG) and Erdman (JWJr). Bioavailability of calcium from tofu, tortillas, nonfat dry milk and mozzarella cheese in rats. Effect of supplemental ascorbic acid. *Journal of Food Science* 53(1); 1988; 208-210, 230

Using a rat model, Ca bioavailability (BV) from tofu, tortillas, nonfat dry milk (NFDM) and mozzarella cheese was compared to a control diet supplemented with calcium carbonate. The above diets were each formulated with and without 0.05% ascorbic acid. When comparing different calcium sources, the relative BV from tofu (107%) was significantly higher ($P < 0.05$) than from tortillas (93%) or NFDM (95%). Calcium BV from tofu, cheese (105%) and calcium carbonate (100%) was not different. Vitamin C supplementation has no significant effect on calcium BV. Although some differences were noted, overall calcium BV from each of the tested products was excellent. AS

Soy proteins

- 2297 Honig (DH), Rackis (JJ) and Wolf (WJ). Effects of pH and salt on yields, trypsin inhibitor content, and mineral levels of soybean protein isolates and wheys. *Journal of Agricultural and Food Chemistry* 35(6); 1987; 967-971

Great Northern beans

- 2284 Reddy (NR), Sathe (SK) and Pierson (MD). Removal of phytate from Great Northern beans (*Phaseolus vulgaris* L.) and its combined density fractions. *Journal of Food Science* 53(1); 1988; 107-110, 147

The effect of pH on the dissociation of phytate complexes and subsequent removal of phytate from Great Northern bean (GNB) flour and its combined density fraction (CDF) was investigated. The largest amount of phytate removed was from GNB flour and CDF dispersions adjusted to pH 7.0 during dialysis. Dialyzed, unadjusted GNB flour and CDF resp. contained 55.4% and 59% of phytate resp. in water soluble form. The results indicate that phytic acid is present in GNB as a water soluble salt with a mole. wt. less than 1,000 daltons, water soluble complex with mole. wt. more than 1,000 daltons. The presence of phytate in the CDF did not affect in vitro digestibility of CDF proteins. AS

Haricot beans

- 2285 Kermasha (S) and Metche (M). Studies on seed peroxidase *Phaseolus vulgaris* cv. haricot. *Journal of Food Science* 53(1); 1988; 247-249, 252

Phaseolus vulgaris cv. haricot seed peroxidase was extracted and partially purified. The precipitation of an active peroxidase fraction with solid ammonium sulphate (at 35 - 90% saturation) increased its activity by a factor of 3. The pH for optimum activity was 5.4. The addition of 4 μ m hydrogen peroxide increased the activity 92-fold; however, enzyme activity was decreased by higher concn. of this reagent. Carbonyl compounds resulting from peroxidase activity were isolated as their dinitrophenylhydrazones and then purified by preparative TLC. Subsequent GC-MS analysis revealed that acetone was the principal carbonyl compound resulting from enzyme activity. AS

Peas

Pea starch

- 2286 Hasse (NU), Kempf (W), Tegge (G) and D'heur (U). Comparative investigation on the wet-separation of pea starch. *Starch/Stärke* 39(12); 1987; 416-421

Peas contain starches with partly high amylose fractions. As exact analytical investigation do not exist yet, the first thing is to develop an efficient technique to isolate these starches. Therefore, in this study three laboratory procedures of wet milling which are based on settling tables, centrifugation and extraction are compared. In this connection the efficiency of protein separation was of importance. A short contact of the ground peas with sodium hydroxide resulted in a comparably high starch quality when using tables as well as centrifuges. However, the recovery rate of starch was 30% higher when using tables. Compared to the other procedures the extraction method led to starches of much lower quality with regard to the tested quality criteria. An additional comparison of different pea species

indicated that the starch separation from smooth peas is more efficient than that from wrinkled peas. AS

Winged beans

- 2287 Sukhdev Singh, Kanwalpreet Gill, Soni (GL) and Rattan Singh. Nutritional evaluation of winged bean effect of hepatic dehydrogenases. Indian Journal of Nutrition and Dietetics 24(10); 1987; 319-324

Analysis of winged bean showed that it contained antinutritional factors like trypsin inhibitors, haemagglutinins and saponins. Feeding of albino rats with winged bean to replace 5 to 20% protein showed cessation of growth accompanied by decreased food intake. Feeding winged bean at lower levels increased the activities of certain hepatic dehydrogenases, but at higher levels in the diet the activities of the dehydrogenases were suppressed. Supplementation with milk powder could reduce the bad effect of winged bean. NGKR

OILSEEDS AND NUTS

- 2288 Chandrasekhara (MR). An emerging science. Use for oil seed cake, nutritional value, extrusion cooking and green revolution. Indian Food Industry 7(1); 1988; 12-15

Groundnuts

- 2289 Rubico (SM), Resurreccion (AVA) and Beuchat (LR). Comparison of sensory properties of headspace volatiles of a peanut beverage processed at different temperature and time conditions. Journal of Food Science 53(1); 1988; 176-180

Differences in sensory qualities of a peanut beverage processed at 85, 100, 121 C for 5, 15 and 25 min were determined using analysis of variance (ANOVA) techniques. Temp. significantly affected cooked flavour, raw and cooked odours, viscosity and colour. Time had significant effects only on cooked flavour and colour. Factor analysis was used to determine relationships among sensory qualities and gas chromatographic peaks of the headspace volatiles. Seven factors accounted for 91% of data variance. Processing at 100 C yielded a peanut beverage with sensory quality better than the product processed at either 121 C or 85 C. AS

Rapeseeds

- 2290 Hase (A), Johansson (M-L) and Viljava (T-R). Sources of error in the analysis of glucosinolates by gas liquid chromatography. Journal of the American Oil Chemists' Society 65(4); 1988; 647-651

A study was made of the accuracy and precision of glucosinolate detn. by gas liquid chromatography (GLC) after transformation of the glucosinolates to desulphoglucosinolates and silylation. The condi-

MILLETS

Corn

- 2278 Bakshi (AK), Saxena (AK), Sharma (AK), Khara (AS), Dhillon (BS) and Srivastava (PK). Effect of storage of winter maize on quality. *Indian Journal of Nutrition and Dietetics* 24(10); 1987; 325-330

Winter maize harvested in June was stored in bulk in G.P. sheet metal bins, aerated bins, perforated Jati bins under cold storage and in bags for 6 months and increase in fat acidity was determined and compared with those of heated and unheated samples. The fat acidity increased from 21.0 to 97.5% in heated and from 21.0 to 359.6% (oleic acid) in unheated samples. Bulk stored maize showed slight change in fat acidity irrespective of the container; changes in fat acidity was more pronounced in September to December. Of the different types of storages, the storage bin with forced aeration arrangement proved better over others. Heating of maize flour (spreading in heated air oven at 100 °C for 2 h) before storage arrests lipases activities and this prevents fat acidity development. NGKR

- 2279 Gonzalez (RJ), Torres (RL), De Greef (DM) and Gordo (NA). Application of the response surface methodology to corn grits extrusion cooking. *Revista de Agroquímica y Tecnología de Alimentos* 27(2); 1987; 251-260

An experimental design of the central composite rotatable type was used in the corn grits extrusion-cooking process to analyse the effects of temp. die diameter and moisture on the following responses; die pressure, torque, expansion, sp. vol. amylogram characteristics, mechanical resistance, water absorption, water solubility and Bostwick consistency. Results indicated that the variations of most response of the extruded samples are accounted for by the model obtained with the design. The highest detn. coeff. corresponded to torque, solubility, initial paste consistency and pressure, which were: 0.91, 0.85, 0.84 and 0.80. resp. BV

- 2280 Onigbinde (AO) and Akinyele (IO). Biochemical and nutritional changes in corn (*Zea mays*) during storage at three temperatures. *Journal of Food Science* 53(1); 1988; 117-119, 123

Two cv of corn (*Zea mays*), yellow and white were studied for effect of storage temp. (0, 20, and 55 °C for 7 months) on stability of grain and flour at 13 - 14% moisture. Significant ($P < 0.05$) changes were noticed in the soluble sugars and titratable acidity of the grains at 55 °C and the titratable acidity of yellow corn grains stored at 0 °C and 20 °C. Changes were also noticed in the moisture content of all the samples and browning in the grains at 55 °C ($P < 0.05$). The decrease in the Hunter L-values was greater in the grains than in the flour ($P < 0.05$). No significant differences were found in the pH, free amino N and protein digestibility ($P > 0.05$). BV

Corn proteins

- 2281 Bhattacharya (M) and Hanna (MA). Extrusion processing to improve nutritional and functional properties of corn gluten. *Lebensmittel-Wissenschaft und-Technologie* 21(1); 1988; 20-24

Corn gluten meal (CGM) and blends of CGM and whey at pH 3.85 and 7.00 were extruded under various product and processing conditions. Increases in protein digestibility and water holding capacity (WHC) of the samples were measured. Extrusion increased both the digestibility and water holding capacity. Increases in digestibility and WHC were greater at higher pH. The addition of whey had no significant effect on the increase in digestibility or WHC of the extruded product. Amino acid profiles of the best functional end product indicated very little change in the amino acid profile. In spite of the improvement in functionality, the Calculated Protein Efficiency Ratio (C-PER) of CGM remained poor. AS

PULSES

- 2282 Nielsen (SS) and Liener (IE). Effect of germination on trypsin inhibitor and hemagglutinating activities in *Phaseolus vulgaris*. *Journal of Food Science* 53(1); 1988; 298-299, 301

Measurements of trypsin inhibitor and hemagglutinating activities were made daily during a 10-day period of the germination of *Phaseolus vulgaris*. When these results were expressed on the basis to decrease until the ninth day, hemagglutinating activity decreased gradually and by the tenth day had reached less than 10% of the original activity. Expression of the data on a per cotyledon basis revealed a much earlier and greater reduction in both of these activities. The *in vitro* digestibility of the protein did not undergo any significant change through the 10 days of germination. AS

Broad beans

- 2283 Shukla (A), Sharma (YK) and Mamta Bargale. Chemical constituents of broad bean (*Vicia faba* (L)), as compared to soybean (*Glycine max.* L. Merrill) with special references to their seed size. *Indian Journal of Nutrition and Dietetics* 24(11); 1987; 353-357

Nine var. of broad bean were divided into 3 groups according to seed size and were compared with three var. of soybean grouped into small, medium and bold. Results showed that fababean contained higher amounts of moisture, total carbohydrate, free soluble sugar and starch while soybean had higher content of ash, protein, oil and carotene irrespective of the seed size. The contents of non-protein N reducing and non reducing sugars and crude fibre were almost equal in both the seeds. The oil content in small, medium and bold seeds of fababean was 1.13, 2.35, and 1.92% and in soybean it was 19.94, 21.08 and 23.07% resp. However, reducing sugar and carotene in fababean and carotene in soybean had inverse relationship with seed size. NGKR

mycoflora associated with rice grain in storage has been studied by adopting soil vial method. This effect of leaf extracts was tested against 4 *Aspergillus niger*, *A. flavus*, *Drechslera* sp., *Chaetomium globosum* dominant grain mycoflora of rice at two concn. viz. 50 and 100% (aqueous extracts). The results showed that all the 7 plants were found to be toxic to the fungi irrespective of the concn. but it was found to be max. at 100% concn. However, no leaf extract could completely inhibit fungus growth and 4 test fungi showed differential sensitivity to leaf extracts. NGKR

Rice bran

- 2272 Singaravadivel (K), Anthoni Raj (S) and Iengar (NGC). Prevention of FFA increases in bran through processing and preservation. *Journal of the Oil Technologists' Association of India* 19(2); 1987; 32-35

Free fatty acid (FFA) in rice bran was reduced by cleaning the paddy free of chaff and immature grains before milling. FFA was also reduced in bran by parboiling of cleaned paddy by pressure parboiling, hot soaking, double steaming or single steaming. Preservation of high moisture paddy through application of 5% salt and 20-30% husk powder not only protected the grain from spoilage but also prevented rapid increase of FFA in such grains. Dipping in soaked grains in brine (16%) for 2 min before steaming to protect the parboiled grains during humid weather prevented rapid FFA increase when the paddy is slowly or inadequately dried. KAR

Wheat

- 2273 Bakhshi (AK) and Rains (GS). A study of granulation of flours and whole-meals (attas) of Durum and bread wheat cultivars. *Bulletin of Grain Technology* 26(1); 1988; 43-48

The milling quality and granulation of flours and whole meals (attas) of durum wheat cv. of 10 var. was studied along with two commercial bread wheat var. Average recovery of flour was lower for durum than for bread wheats. Due to the vitreous nature of the durum kernels the yield of break flour was 3.5% only compared to 7.5% for bread wheats. About 28.9% particles in durums were > 100 micron whereas in bread wheats it was 21%. Durum wheat flours and whole meals were coarser than those of bread wheats. Considerable inter varietal differences in the granulation of the whole meals as well as flours in durum wheat cv. were also noted.

- 2274 Girish (GK), Garg (HO), Tripathi (BP) and Mahendra Singh. A study to assess quality of wheat arrivals in major grain mandis of Punjab, Haryana, U.P. and M.P. during 1985-86 and 1986-87 in relation to the uniform specifications prescribed by Government of India, Department of Food. *Bulletin of Grain Technology* 26(1); 1988; 3-29

For the purpose of assessing the quality of wheat arrivals in major grain markets of Punjab, Haryana, U.P. and M.P. surveys were conducted during 1985-86 and 1986-87 to examine the samples as per the Indian Standards Specifications. 616 samples during 1985-86 and 1124

samples during 1986-87 were analysed for foreign matter, other food grains, slightly damaged grains, shrivelled and broken grains and moisture content. The results indicated that the existing specifications are too liberal which should be tightened with respect to the above parameters. It was also found necessary that a separate provision for Karnal bunt affected grains and hectolitre wt. may be laid down. NGKR

- 2275 Lippert (GE) and Hagstrum (DW). Detection or estimation of insect populations in bulk-stored wheat with probe traps. *Journal of Economic Entomology* 80(3); 1987; 601-604

The probe traps and grain probes are compared as sampling devices. A method to adjust catch data has been developed so that traps can be used to obtain the more absolute estimation of insect population density provided by grain probes. Criteria to determine how many traps to use have also been established. MVG

Wheat flour

- 2276 Chen (H), Rubenthaler (GL) and Schanus (EG). Effect of apple fiber and cellulose on the physical properties of wheat flour. *Journal of Food Science* 53(1); 1988; 304-305

This study investigates the effect of apple fiber and cellulose on the physical properties of wheat gluten and mixing properties of wheat flour. The results of water-holding capacities (WHC) and mixing properties indicated as possible interaction between fiber and gluten which reduced the WHC of mixtures. Mixograph studies of wheat flour and fiber mixtures demonstrated that the dilution of gluten by fiber could not account for all the observed changes in mixing properties of the wheat flour/fiber blends. The possible interaction of fiber and gluten may explain the poor baking properties of apple fiber bread. BV

Wheat proteins

- 2277 Barber (S), Esparza (M) and Martinez-Anaya (MA). Characterization of wheat gluten obtained by a mechanical semipilot process. *Revista de Agroquímica y Tecnología de Alimentos* 27(2); 1987; 279-290

Two different procedures, mechanical (A) and semimechanical (AM) of a semipilot process for gluten extraction have been designed. These methods, as compared with hand-washing (M) extraction, allows to obtain substantially higher quantities of gluten, providing that the same time and work input were employed (A 125; AM 125; M 25 g gluten/h). The extracted glutes were studied for : 1) purity, 2) chemical composition, 3) gliadin and lipid components, and 4) functional properties (farinograph, maturograph, oven rise recorder and baking test). Gluten yield (g gluten d.b./100 g flour) was about 10% in every case. A and AM glutes had high protein content (78% d.b.) but lower than M (88% d.b.). A, AM and M glutes were, nevertheless, similar in gliadin and lipid composition, and showed a comparable baking performance. AS

- 2346 Analytical Working Party of the Starch Experts Group of the European Starch Association. Measurement of the starch content of commercial starches. *Starch/Stärke* 39(12): 1987; 414-416

- For the EC starch regulation 2169/1986 a min. purity of 97% starch on dry substance is required to obtain the new end-use refunds. Three different methods for the detn. of starch were tested. Two polarimetric methods (EC L123/72, AOC 14031-032) and an enzymatic method (EC L158/86) were used to determine the high starch content of commercial unmodified starches. The results of a ring test between six lab. shows that the AOC method, solubilizing the starch in the presence of CaCl₂, has the smallest standard deviation. An explanation for the differences observed between the three methods is given, based on the sugar spectrum of the hydrolyzed starch. An independent ring test in France shows a modified enzymatic method, developed by AFNOR (The French standard organization) produces satisfactory results. AS
- 2347 Franco (CML) and Ciacco (CF). Studies on the susceptibility of granular cassava and corn starches to enzymatic attack. Part I: study of the conditions of hydrolysis. *Starch/Stärke* 39(12): 1987; 432-435

In this research, the susceptibility of starch granules to enzymatic hydrolysis was studied. Cassava and corn starches were hydrolysed by bacterial Alpha amylase with and without amyloglycosidase under several conditions of incubation. The highest percentage of hydrolysis was obtained in the presence of both enzymes. Elimination of the soluble hydrolysis products by dialysis increased the degradation of the starch granules, especially with cassava starch. AS

Ba) starch

- 2348 Soni (PL), Sharma (HW), Bisen (SS), Srivastava (HC) and Gharla (MH). Unique physico-chemical properties of Sal (*Shorea robusta*) starch. *Starch/Stärke* 39(12): 1987; 411-413

The sal starch has more N, P, lipids, amylose and water binding capacity in comparison to other starches. The sal starch is more soluble at any particular degree of swelling. Paste viscosity curve showed no drop in viscosity after full gelatinization had taken place, i.e. the paste is stable on continued cooking. BV

BAKERY PRODUCTS

Bread

- 2349 Oguntola (OA), Jeon (J) and Ponte (JG). Functional properties of hydrolyzed whey permeate types in bread formulations. *Journal of Food Science* 53(1): 1988; 215-217

Results suggested antagonistic effects between sulphur dioxide/sorbate, sulphite/ butylparagen and butylparaben-ethanol/ sulphur dioxide and butylparaben/sorbate. No synergistic effects were detected. NCSU 76 had higher MICs than Montrachet 522 for all individual antimicrobial agents indicating greater resistance to these compounds. On an individual molar basis, MIC results indicated butylparaben was more inhibitory than the other antimicrobial agents alone. AS

- 2269 Parish (ME) and Carroll (DE). Effects of combined antimicrobial agents on fermentation initiation by *Saccharomyces cerevisiae* in a model broth system. *Journal of Food Science* 53(1); 1988; 240-242

Effects of sodium benzoate, potassium sorbate, sodium metabisulphate (sulphur dioxide), butyl p-hydroxybenzoic acid and their dual combinations were observed against the ability of the wine yeast, *Saccharomyces cerevisiae*. Butylparaben and combinations involving butylparaben most effectively inhibited fermentation initiation. Combinations involving sulphur dioxide had lower antimicrobial activities than either sulphur dioxide or the other individual compound alone indicating antagonistic effects between sulphur dioxide and the other antimicrobial agents tested. Apparent additive antimicrobial effects were observed for butylparaben/ sorbate, butylparaben/ benzoate and benzoate/sorbate. AS

CEREALS

- 2270 Mohny (SM), Hernandez (RJ), Giacin (JR), Harte (BR) and Miltz (J). Permeability and solubility of d-limonene vapour in cereal package liners. *Journal of Food Science* 53(1); 1988; 253-257

Studies were carried out on the solubility and permeability of limonene vapor in two cereal package liners. The effect of limonene partial pressure on the permeation rate and permeability coeff. was determined over a concn. range of 0.3 to 7 p.p.m (wt/v). The equilibrium sorption concn. and solubility coeff. of limonene in the liner films were also determined by a micro-balance gravimetric technique. Data obtained provided information necessary for the estimation of the storage quality of packaged fruit-flavoured cereal product whose quality is related to the retention of volatile aroma constituents within the package headspace. AS

Rice

- 2271 Rama Devi (P), Subramanyam (K), Krishna Rao (V) and Chiranjeevi (V). Effect of certain plant extracts on rice grain mycoflora. *Bulletin of Grain Technology* 26(1); 1988; 55-58

The antifungal activity of aqueous leaf extracts of plants, neem (*Azadirachta indica*), blue gum (*Eucalyptus* sp.), thorn apple (*Datura stramonium*), periwinkle (*Vinca rosea*), tobacco (*Nicotiana tabacum*), sacred basil (*Ocimum sanctum*) and mango (*Mangifera indica*) against

The effects of various preparations of hydrolysed (lactose) whey permeate syrups (HWPS) on functional properties of doughs and breads and their possible use as primary sweeteners in white pan bread formulations is investigated. Results indicated little significant differences in the yeast fermentation rate, proof time, and bread quality among dough formulated with sucrose (control) and HWPS. 75% hydrolysed and demineralized syrups produced good functional qualities of dough and yielded bread of equal to or better than the control containing sucrose. The 50% hydrolysed syrups produced slightly drier doughs whereas the 95% HWPS were slightly soft. The 50% hydrolyzed syrup breads showed darker crust colours. Breads made with demineralized 50% and 95% HWPS were firmer than the control. HWPS thus serve as potential replacements for sucrose in white pan breads. BV

- 2350 Payton (SB), Baldwin (RE) and Krause (GF). Bread formulation designed for the elderly using response surface methodology. *Journal of Food Science* 53(1); 1988; 302-303

This study was carried out to determine the flavour characteristics of commercial bread that have appeal for the elderly and to apply response surface methodology to identify a formulation for bread that would have the above characteristics and would supply Ca, thiamin, and riboflavin. BV

- 2351 Serna-Saldivar (SO), Lopez-Ahumada (G), Ortega-Ramirez (R) and Dominguez (RA). Effect of sodium stearoyl-2-lactylate on the rheological and baking properties of wheat bread fortified with defatted soybean and sesame meal. *Journal of Food Science* 53(1); 1988; 211-214, 230

Wheat flour was fortified with 8% DSBM (defatted soybean meal), 12% DSBM and 8% DSBM, 4% DSM (defatted sesame meal) to increase the protein content and amino acid profile, and to upgrade the overall nutritional value of the bread. SSL (sodium stearoyl-2-lactylate), at 0.5 and 1% levels, was incorporated into the three bread systems to overcome the deleterious effect of fortification on bread quality. Amylograph peak viscosity, dough elasticity, dough stability and bread volume improved when SSL was used. Addition of 1% SSL improved rheological properties and bread volume to a greater extent than 0.5% SSL. The control (100% wheat) bread had the best flavour, texture and colour scores, followed by the 8% DSBM, 8% DSBM/4% DSM and 12% DSBM breads. AS

Pizzas

- 2352 Dickson (JS). Survival of selected indicator and pathogenic bacteria in refrigerated pizzas. *Journal of Food Protection* 50(10); 1987; 859-861

The sensory and microbiological shelf life of pizzas stored at refrigeration temp. have been evaluated. MVG

MILK AND DAIRY PRODUCTS

- 2353 Dunkley (WL) and Stevenson (KE). Ultra-high temperature processing and aseptic packing of dairy products. *Journal of Dairy Science* 70(10); 1987; 2192-2202

This review discusses regulations that influence progress in commercial manufacture of UHT products, equipment, and processes used in USA and other countries, changes in products during UHT processing and storage, marketing and distribution, quality assurance and scope for future research. NGKR

- 2354 Lopes (JA). Evaluation of dairy and food plant sanitizers against *Salmonella typhimurium* and *Listeria monocytogenes*. *Journal of Dairy Science* 69(11); 1986; 2791-2796

Six commonly used dairy and food plant sanitizers were evaluated against *Salmonella typhimurium* and *Listeria monocytogenes*. Of these six, two were acid anionic sanitizers, one contained a quaternary ammonium compound, one was based on active iodine, and two contained active chlorine. Of the last two, one contained hypochlorite and the other contained active chlorine in organic form. The chlorine-based sanitizers were effective at 100 p.p.m. of available chlorine against both these organisms. The sanitizer containing iodine was effective at 12.5 and 25 p.p.m. titratable iodine against *L. monocytogenes* and *S. typhimurium*, resp. The acid anionic sanitizers were effective at 200 p.p.m. of active agent against both the bacteria, and the quaternary ammonium-based sanitizer was effective at 100 and 200 p.p.m. of active compound against *L. monocytogenes* and *S. typhimurium*, resp. The sanitizer containing iodine at 12.5 and 25 p.p.m. of titratable iodine showed activity equivalent to 50 and 200 p.p.m. of available chlorine, resp. against *L. monocytogenes* and 100 and 200 p.p.m. of available chlorine, resp. against *S. typhimurium*. AS

- 2355 Mulvihill (DM) and Kinsella (JE). Gelation of Beta-lactoglobulin. Effects of sodium chloride and calcium chloride on the rheological and structural properties of gels. *Journal of Food Science* 53(1); 1988; 231-236

The rheological and textural properties and gel strength of Beta-lactoglobulin were markedly affected by NaCl and CaCl concn. Gels of max. compressive strength were obtained with NaCl and CaCl at concn. of 200 and 10 mm resp. Increased NaCl concn. resulted in the formation of soft gels which released water easily. CaCl strengthened Beta-lactoglobulin gels by forming crossbridges. However, above 100 mm it tended to enhance coagulation rather than gelation. BV

Milk

- 2356 Christen (GL), Wang (W-C) and Ren (T-J). Comparison of the heat resistance of bacterial lipases and proteases and the effect on ultra-high temperature milk quality. *Journal of Dairy Science* 69(11); 1986; 2769-

2778

Thirty-four of 49 isolates of psychrotrophic bacteria produced extracellular lipase or protease when grown in rehydrated nonfat dry milk. The cell-free crude preparation from 50% of these had either heat-resistant lipase or protease; in 39% both enzymes were heat resistant. Eight isolates were selected for further evaluation of effect on ultra-high temp. processed milk. Free fatty acids and free amino groups of milk precultured with the bacteria increased at different rates depending on the isolate. Partially purified lipase from one of these bacteria (*Acinetobacter* sp.) caused free fatty acids to increase following ultra-high temp. processing when the milk was stored at 10, 21 or 32 °C for 4 wk. The increase was temp. dependent. Lipase activity of .0012 units/ml added prior to processing caused significant increases in free fatty acid at 21 and 32 °C in 4 wk. AS

- 2357 Cleveland (MZ) and Harris (ND). Oxidation of cholesterol in commercially processed cow's milk. *Journal of Food Protection* 50(10); 1987; 867-871

Presence of certain oxidised cholesterol products in milk (Pasteurised whole milk ultra-high temp. heated milk, canned evaporated milk, skim milk and instant nonfat dry milk) was investigated. TLC data indicated that cholesterol in liquid milk was stable during commercial pasteurisation, sterilisation and evaporation. However, instant nonfat dry milk contained 7-hydroxy-cholesterol. Studies on the effect of heating and storage were also carried out. Heating whole milk for 12 h at 85 °C did not produce oxysterols, but GS-MS analysis indicate that storage of whole milk lipids may produce steroidal ketones. MVG

- 2358 Dannenberg (F) and Kessler (H-G). Reaction kinetics of the denaturation of whey proteins in milk *Journal of Food Science* 53(1); 1988; 258-263

The kinetics of the heat-induced irreversible denaturation of Beta-lactoglobulins (Beta-LG) A and B and of Alpha-lactalbumin (Alpha-LA) in milk were examined over a wide temp./time range (70-150 °C, 2-5400 sec). Denaturation of Beta-LG was best described with an apparent reaction order of 1.5 (Alpha-LA; first order). The abrupt changes in the temp. dependence of the rate constants (Beta-LG at 90 °C, Alpha-LA at 80 °C) were interpreted in terms of the different activation energies and entropies occurring in the two temp. ranges. By using the kinetic parameters for calculating lines of equal degrees of denaturation in a plot of log-time versus 1/absolute temp. it was possible to predict the effect of different heat treatments on the denaturation of individual proteins. AS

- 2359 Gaylord (AM), Warthesen (JJ) and Smith (DE). Influence of milk fat, milk solids, and light intensity on the light stability of vitamin A and riboflavin in lowfat milk. *Journal of Dairy Science* 69(11); 1986; 2779-2784

- 2360 Jimenez (MDA), Gil (MIS), Corvilla (MAP), Luis (M) and Diez (P). Determination of calcium and magnesium in milk by complexometric titration using protein precipitation and complexation with palladiazole or other indicators. *Analyst* 113(4); 1988; 633-635

A simple, rapid and accurate method for the direct detn. of Ca and the indirect detn. of Mg in milk and yoghurt by complexometric titration is proposed. The titration is based on the precipitation of proteins by salicylic acid followed by titration using a complexometric indicator. Palladiazole can be used as the indicator for the detn. of Ca and Mg. The complexometric indicators Eriochrome Black T, Murexide and Calcein can also be used after treating milk with salicylic acid. AS

- 2361 Panon (G), Tache (S) and Labie (C). Antiviral substances in raw bovine milk active against bovine rotavirus and coronavirus. *Journal of Food Protection* 50(10); 1987; 862-866

After experimental contamination of bovine raw and heat treated milks with bovine rotavirus and coronavirus strains, showed a strong viral inhibition only with raw milks, from which virus recovery was 5×10^{-4} %. Between 30% and 80% of the virus was recovered from the heat-treated milks, depending on the level of inoculation. The antiviral substance is heat labile (destroyed within 30 min at 100 °C), precipitated by ammonium sulphate and filtrable (0.45 µm Millipore membrane). it also has neutralizing activity on tissue culture. AS

- 2362 Rerkrai (S), Jeon (IJ) and Bassette (R). Effect of various direct ultra-high temperature heat treatments on flavour of commercially prepared milks. *Journal of Dairy Science* 70(10); 1987; 2046-2054

- 2363 Sikes (A) and Hilton (T). Sensitivity of foodborne bacteria (spoilage and pathogenic) to a methanol-acetone extract of milk fermented by *Streptococcus thermophilus*. *Journal of Food Protection* 50(10); 1987; 812-814

The quantitative impact of an antimicrobial factor(s) elaborated by *Streptococcus thermophilus* on growth kinetics of a low temp. spoilage organism and certain foodborne pathogens, was assessed. MVG

- 2364 Zottola (EA), Cogan (TM) and Kelley (J). Partition of lactic streptococcal bacteriophage during the ultrafiltration concentration of milk and whey. *Journal of Dairy Science* 70(10); 1987; 2013-2021

Skim milk

- 2365 Amin (MK) and Draughon (FA). Growth characteristics of *Yersinia enterocolitica* in pasteurized skim milk. *Journal of Food Protection* 50(10); 1987; 849-852

The growth of *Yersinia enterocolitica* (5 strains) in refrigerated pasteurized milk at 4 °C was characterised when inoculated at various levels (10/1000 cells/ml of the organisms for 0, 3, 7, 14 and 21 days) with *Y. enterocolitica*. Results showed that all strains com-

peted very well with background microflora and reached levels of log 5.0 to 7.0/ml after 7 days at 4 C. Level of incubation had little or no effect on the total number of *Y. enterocolitica* after 14 or 21 days at 4 C. Generation times at 4 C were highly strain-dependent. MVG

Milk products

Butter

- 2366 Abbar (FM) and Mohamed (MT). Occurrence of enteropathogenic *Escherichia coli* serotypes in butter. *Journal of Food Protection* 50(10); 1987; 829-831

Occurrence of *Escherichia coli* in butter is described with special reference to the increasing incidence of coliforms resistant to different antibodies. MVG

- 2367 Damiani (P) and Burini (G). Determination of diacetyl in butter as 2, 3-diamino naphthalene derivative, using fluorometric procedure reverse phase liquid chromatography with fluorescence detection. *Journal of the Association of Official Analytical Chemists* 71(3); 1988; 462-465

Fluorometric and reverse phase liquid chromatographic methods for the detn. of a derivative of diacetyl are described. MNK

Cheese

- 2368 Somers (EB) and Taylor (SL). Antibotulinal effectiveness of nisin in pasteurized process cheese spreads. *Journal of Food Protection* 50(10); 1987; 842-848

The antibotulinal effectiveness of nisin in pasteurised processed cheese spread was studied to determine if addition of nisin would allow for winter flexibility in the formulation of these spreads. Results show that nisin as an effective antibotulinal agent in this product and allows formulation of pasteurised processed cheese spread with reduced sodium levels (1.4% disodium phosphate and no sodium chloride) or slightly higher moisture levels (55 to 57%) by comparison to typical commercial spreads. However, higher levels of nisin (100 and 250 p.p.m.) were required for spreads with highest moisture levels or most greatly reduced moisture levels. MVG

Milk powders

- 2369 Nourooz-Zadeh (J) and Appelqvist (LA). Cholesterol oxides in Swedish foods and food ingredients. Milk powder products. *Journal of Food Science* 53(1); 1988; 74-79, 87

Cream, whole milk and skim milk powders had 1.6, 2.0, and 18.9 mg cholesterol/g fat, resp. About 90% of the cholesterol was unesterified. Analyses of fresh spray-dried whole and skim milk powders from "low and medium heat" conditions and fresh roller-dried whole milk powder from "low heat" conditions contained less than 0.1 p.p.m. cholesterol oxides in lipids. However, spray-dried whole and skim

milk powders from "high heat" conditions has substantial levels of some important cholesterol oxides. Skim-milk powders, stored in big sacks for 11-37 months and small consumer packages for 2-23 months, contained variable amounts of 5, 6 Alpha-epoxy-5 Beta-cholestan-3Beta-ol (0.3-4.0 p.p.m), 5, 6 Beta-epoxy-5 Alpha-cholestan-3 Beta-ol (0.7-10.40 p.p.m), cholest-5-ene-3 Beta, 7 Alpha-diol (0.5 > 16.2 p.p.m), cholest-5-ene-3 Beta, 7 Beta-diol (1.3-20.8 p.p.m), cholest-5-ene-3 Beta, 20 Alpha-diol (0.6-2.7 p.p.m), cholest-5-ene-3.25-diol (0.3-0.8 p.p.m), 5 Alpha-cholestan-3Beta, 5, 6 Beta-triol (1.3-2.5 p.p.m) and 3-hydroxy-cholest-5-ene-7one (1.8-24.9 p.p.m). AS

Milk proteins

Casein

- 2370 Morr (CV) and Seo (A). Fractionation and characterization of glycomacropeptide from caseinate and skim milk hydrolysates. *Journal of Food Science* 53(1); 1988; 80-87

Glycomacropeptide (GMP) was isolated from crystalline rennin and microbial rennet hydrolyzed caseinate and skim milk by Sephadex gel filtration, DEAE Sephadex ion exchange chromatography, Con A-Sepharose affinity chromatography and exhaustive dialysis and characterized by size exclusion and reversed phase high performance liquid chromatography (HPLC) and sodium dodecyl sulphate gel electrophoresis (SDS-PAGE). Size exclusion HPLC revealed one major GMP peak with a mol. wt. of 33,000 daltons. SDS-PAGE revealed a group of size-heterogeneous peptides with mol. wt. of less than or equal to 18,000 daltons. Reversed phase HPLC revealed one major GMP peak with several minor peptides, indicating heterogeneity with respect to hydrophobicity/polarity. AS

MEAT AND POULTRY

- 2371 Breton (C), Thanh (LP) and Paraf (A). Immunochemical properties of native and heat denatured ovalbumin. *Journal of Food Science* 53(1); 1988; 222-225

The sensitivity of different methods to detect the denatured vs native ovalbumin with affinity purified antibodies against the native ovalbumin is presented. BV

Meat

- 2372 Buchowski (MS), Mahoney (AW), Carpenter (CE) and Cornforth (DP). Heating and the distribution of total and heme iron between meat and broth. *Journal of Food Science* 53(1); 1988; 43-45

The effect of heat on movement of total and heme iron from meat to broth was investigated. Total iron by a wet ash method was nearly identical to the sum of heme iron plus nonheme iron. The total amount of nonheme iron increased with cooking temp. ($r=0.98$), as did the amount of nonheme iron in the broth ($r=0.93$). Leaching of heme pig-

ments into the broth was greatest at 60 C. Boiling (97 C) rapidly coagulated the meat pigments and minimized the leaching of heme pigments into the broth. More total iron (85.3%) was retained in boiled (97 C) meat than in meat heated 1 h at 60 C (81.6%), 77 C (78.2%) or autoclaved (77.5%). AS

- 2373 Oellingrath (IM). Heat degradation of heme in methemoglobin and metmyoglobin model systems measured by reversed-phase ion-pair high performance liquid chromatography. *Journal of Food Science* 53(1); 1988; 40-42

The effect of heat treatment on heme degradation in methemoglobin and metmyoglobin model systems was investigated. The extent of heme degradation was found to be different above and below the denaturation temp. of the proteins. Heme degradation as a function of time followed hyperbolic curves at 78 C, 100 C, and 120 C. After 1 h heating the degradations of heme at 78 C and 100 C was similar, being approx. 22% in metmyoglobin solutions and 26% in methemoglobin solutions. Autoclave heating for 2 h degraded 87.5% and > 95% of the methemoglobin and metmyoglobin solutions, resp. AS

- 2374 Payne (NN) and Rizvi (SSH). Rheological behavior of comminuted meat batters. *Journal of Food Science* 53(1); 1988; 70-73, 87

Good agreement was observed between the shear stress-shear rate results obtained with a capillary extrusion viscometer and the yield stress as determined with a rotational viscometer. The frankfurter batter used in this study was pseudoplastic with a flow behaviour index of 0.2-0.4, and a yield stress of approx. 840 Pa at 10 C. To compare the effects of batter composition, an apparent viscosity term was defined. Dilution of the batter resulted in reduced apparent viscosities, while increased fat led to increased apparent viscosities. Although chopping time significantly altered the stability of the batter and the visco-elastic properties of the cooked product, no significant difference in the apparent viscosity was detected. The observation was discussed in light of the apparent insensitivity of viscosity measurements to the degree of fat comminution. AS

- 2375 Truscott (RB) and Lammerding (AM). Millipore filtration and use of RV medium for isolation of *Salmonella* from preenrichment broths. *Journal of Food Protection* 50(10); 1987; 815-819

The recovery of *Salmonella* from naturally and artificially contaminated meat and poultry products following a preenrichment time of 18 h in nutrient broth using Rappaport-Vassilidis medium, tetrathionate brilliant green broth and selenite cystine enrichment broth, was compared. MVG

Beef

- 2376 Clarke (AD), Sofos (JN) and Schmidt (GR). Effect of algin-calcium, pH and muscle proteins on gelation and microstructure of gels and structured beef. *Lebensmittel-Wissenschaft und-Technologie* 21(1); 1988; 46-53

- 2377 Coleman (ME), Rhee (KS) and Cross (HR). Sensory and cooking properties of beef steaks and roasts cooked with and without external fat. *Journal of Food Science* 53(1); 1988; 34-36, 61
- 2378 Duszkiwicz-Reinhard (W), Khan (K) and Funke (B). Microbiological evaluation of navy bean protein concentrate and its blend with retail ground beef. *Journal of Food Science* 53(1); 1988; 88-92

A protein conc. (NPC), obtained by alkali extraction of navy beans, was used as model medium for microbial growth. Only three among eight bacterial cultures (*Pediococcus* spp, *Pseudomonas* spp and *Streptococcus* spp, grew better on mediums with NPC than on the control nutrient broth. Retail ground beef with and without 5%, 10%, and 15% NPC was wrapped with plastic film and stored up to 6 days at 4 C. Aerobic plate count, psychrophiles, coliforms, yeasts and molds were determined at 0, 3, and 6 days. All levels of NPC added to ground beef had a significant influence on aerobic plate count and coliforms. Growth of psychrophiles and yeasts and molds was not affected by NPC. *Lactobacillus* spp was a dominant part of the microflora of all samples. AS

- 2379 Hintlian (CB) and Hotchkiss (JH). Microbiological and sensory evaluation of cooked roast beef packaged in a modified atmosphere. *Journal of Food Processing and Preservation* 11(2); 1987; 171-179

This study was conducted to find the effectiveness of the optimum modified atm.(MA) to air at refrigeration temp. (4.4 C) for the shelf life extension of both uninoculated and inoculated, sliced, cooked roast beef along with its sensory evaluation. The modified atm. consisted of 75% carbon dioxide, 15% N and 10% O and stored at 4.4 C for 42 days to evaluate the MA's effectiveness at controlling the outgrowth of *Pseudomonas fragi*, *Clostridium perfringens*, *Staphylococcus aureus* and *Salmonella typhimurium* after inoculation. The results on sensory characteristics of uninoculated samples showed that *P. fragi* was able to grow only to a limited extent in the MA but grew in air in high numbers. The numbers of *S. typhimurium* and *C. perfringens* decreased more rapidly in the MA than in air but *S. aureus* numbers did not decrease in either atm. The MA decreased the number of molds and product deteriorated in the first 7 days of storage. NGKR

- 2380 Lanari (MC), Bevilacqua (AE) and Zaritzky (NE). Changes in tenderness during aging of vacuum-packaged beef. *Journal of Food Processing and Preservation* 11(2); 1987; 95-109

In this study the changes in tenderness during aging of Argentine beef vacuum packaged in low-permeability films using two different mechanical methods were analysed, the parameters of the kinetic model evaluated and also the aging times at different storage temp. were determined since the refrigerated beef exports play important role in Argentine economy. In this connection the variation of tenderness during aging of vacuum packed beef at different storage temp. viz. 0, 4, 10 and 13 C was evaluated using Tensile and Warner Bratzler (WB). The coeff. of variation corresponding to each method

demonstrated the usefulness of the WB shear test with cooked beef. The model developed was found to be adequate to represent the time dependence of different aging indicators viz. Biochemical index of myofibrillar aging (BIMA) and yield point (YP). NGKR

- 2381 Mustafa (FA). Moisture, fat and cholesterol content of some raw, barbecued and cooked organ meats of beef and mutton. *Journal of Food Science* 53(1); 1988; 270-271

The changes in the initial total moisture, fat and cholesterol content in brain, heart, kidney, liver and tongue of local Iraqi beef and mutton after barbecuing or conventional cooking is studied. Moisture, fat and cholesterol content differed significantly ($P < 0.05$) between raw and barbecued samples and between raw and cooked samples of both beef and mutton organ meats, except for those mentioned. The lower moisture in barbecued and cooked samples probably caused a relative increase in fat and cholesterol content. Minor differences in moisture, fat and cholesterol content of raw, barbecued and cooked organ meats from beef and mutton at similar animal ages was noticed. BV

- 2382 Paterson (BC) and Parrish (FCJr). Factors affecting the palatability and shelf life of precooked, microwave-reheated beef roasts. *Journal of Food Science* 53(1); 1988; 31-33

- 2383 Rhee (KS), Ziprin (YA) and Ordonez (G). Catalysis of lipid oxidation in raw and cooked beef by metmyoglobin hydrogen peroxide nonheme, iron, and enzyme systems. *Journal of Agricultural and Food Chemistry* 35(6); 1987; 1013-1017

The effects of addition of metmyoglobin (MetMb)-hydrogen peroxide nonheme iron (Fe^{2+}), and the components of microsomal (or mitochondrial) enzymic lipid peroxidation system on lipid oxidation in water-extracted beef muscle residues stored at 4 °C were studied. Metmyoglobin hydrogen peroxide at molar ratios ranging from 1:0.1, to 1:2 (0.26 mM MetMb with 0.026-0.52 mM hydrogen peroxide) catalyzed the oxidation of beef muscle lipids in both raw and cooked systems. Metmyoglobin alone had little or extremely low catalytic activity. The catalytic activity of MetMb-Hydrogen peroxide was highest at the molar ratio of approx. 1:0.25 in the raw residue system and at the molar ratio of 1:1.5 or 1:2 in the cooked system. The catalytic effect of MetMb hydrogen peroxide was ascribed to "activated MetMb" and the nonheme iron released from MetMb. Activated MetMb, nonheme iron, and enzyme systems all played a major role in the catalysis of lipid oxidation in beef. AS

Bovines

- 2384 Duarte (FJ), Arroyo (O), Beristain (DI), Argaiiz (A) and Carcia (HS). Enzymatic hydrolysis of whole bovine blood and its relationship to some colligative properties. *Journal of Food Science* 53(1); 1988; 272-273

The present study investigates the relationship between the

degree of hydrolysis of whole bovine blood proteins, measured by a conventional pH-stat method, with the variation in some colligative properties and viscosity of the substrate solution. BV

- 2385 Ringkob (TP), Marsh (BB) and Greaser (ML). Change in titin position in postmortem bovine muscle. *Journal of Food Science* 53(1); 1988; 276-277
- 2386 Sacks (MS), Kronick (PL) and Buechler (PR). Contribution of intramuscular connective tissue to the viscoelastic properties of post-rigor bovine muscle. *Journal of Food Science* 53(1); 1988; 19-24

Steers

- 2387 Medeiros (LC), Field (RA), Medeiros (DM) and Russell (WC). Effect of altitude and management system on the iron content of beef. *Journal of Food Science* 53(1); 1988; 37-39

Pork

- 2388 Ehioba (RM), Kraft (AA), Molins (HW), Walker (HW), Olson (DG), Subbaraman (G) and Skowronski (RP). Identification of microbial isolates from vacuum-packaged ground pork irradiated at 1 kGy. *Journal of Applied Bacteriology* 53(1); 1988; 278-279

Bacterial cultures from irradiated (1kGy) and nonirradiated, vacuum-packaged ground pork held at 5 °C were isolated and characterized over a 12-day storage period. The initial flora of the meat was composed mostly of *Pseudomonas* Sp. and *Enterobacter* sp. Although the microflora of nonirradiated samples gradually shifted from Gram-negative to Gram-positive microorganisms. 76% of the isolates were characterized as Gram-negative at the onset of spoilage (9 days at 5 °C). In contrast, the irradiated ground pork microflora was mainly Gram-positive (66%) shortly after irradiation and increased to 97% after 9 days at 5 °C. A total of 720 isolates were identified to genus. AS

- 2389 Marcy (JA), Kraft (AA), Hotchkiss (DK), Molins (RA), Olson (DG), Walker (HW) and White (PJ). Effect of acid and neutral pyrophosphates on the natural bacterial flora of a cooked meat system. *Journal of Food Science* 53(1); 1988; 28-30
- 2390 Marcy (JA), Kraft (AA), Hotchkiss (DK), Molins (RA), Olson (DG), Walker (HW) and White (PJ). Effect of acid and alkaline pyrophosphate blends on the natural flora of cooked meat system. *Journal of Food Science* 53(1); 1988; 25-27

Rabbits

- 2391 Cambero (MI), De La Hoz (L), Sanz (B) and Ordonez (JA). Ceramide hexosides in rabbit meat. *Journal of Food Science* 53(1); 1988; 274-275

Characterization of ceramide hexosides from glycolipid fractions obtained by silicic acid-celite column chromatography from the crude lipid extracts of different batches of rabbit meat has been studied.

Thin-layer chromatographic analysis showed that monogalactosyl and monoglycosylceramide were found in wild rabbit and suckling and 70 days old New Zealand rabbits. Diglycosylceramide was detected in wild rabbits and triglycosylceramide was present only in suckling New Zealand rabbits. BV

Meat products

Frankfurters

- 2392 Bushway (AA), Lecomte (NB), Work (TM) and True (RH). Characteristics of frankfurters prepared from mutton and fowl. *Journal of Food Science* 53(1); 1988; 67-69

The nutritional, chemical, physical, and sensory properties of mutton and fowl (M/F) frankfurters were compared to those of an all beef frankfurters. The M/F frankfurters were higher (P less than or equal to 0.05) in niacin and thiamin than the beef frankfurters. The mineral content was consistent with that of other processed meat products. The water-holding capacity, and emulsion stability of the M/F were superior. The M/F frankfurters were preferred over the beef for juiciness and flavour. BV

Poultry

Chickens

Broilers

- 2393 Heath (JL) and Owens (SL). Effect of tumbling solutions containing ethanol on tenderness and yield of broiler breasts. *Journal of Food Processing and Preservation* 11(2); 1987; 159-169

This research was carried out to find out whether short time exposure to alcohol in the tumbling solution has an effect on tenderness and yield of broiler breasts. It was seen that tumbling broiler breasts in ethanol caused an initial toughening that was overcome by increasing the length of time they were tumbled and by increasing holding time after tumbling. As alcohol level increases its tenderising effect also increases. Moisture content of the tissue was larger when 4% alcohol was used but neither tumbling time nor holding time had any effect. It was also found that breasts tumbled in 4% alcohol had smaller cooking losses and these decreased with increasing holding time. The alcohol level did not alter the proximate composition of the tumbling solutions. NGKR

Quails

- 2394 Singh (RP) and Panda (B). Influence of frozen storage on the lipid stability of quail carcass. *Indian Journal of Poultry Science* 22(3); 1987; 185-189

Oxidative and lypolytic changes in adipose and non-adipose tissues of broiler-quail (5 wk old) carcasses were studied during 6

months of frozen (-10°C) storage. 2-thiobarbituric acid (TBA) and peroxide values (PV) of leg and breast meat and skin increased significantly ($P < 0.01$) during storage, the increase being more during first two months of storage than during subsequent storage. TBA and PV were highest in skin followed by leg and breast meat. Acid value (AV) also showed significant ($P < 0.01$) increase during storage but the differences between tissues were non-significant. Changes in TBA, PV and AV of adipose tissue followed the pattern similar to that of skin. Sensory quality of quail meat gradually declined with storage time but remained organoleptically acceptable up to 6 months of frozen storage. NGKR

Turkeys

- 2395 Ahn (DU) and Maurer (AJ). Concentration of nitrate and nitrite in raw turkey breast meat and the microbial conversion of added nitrate to nitrite in tumbled turkey breast meat. *Poultry Science* 66(12); 1988; 1957-1960

The study was designed to determine the concn. of nitrate and nitrite in fresh turkey meat and the effect of microorganisms on the conversion of nitrate to nitrite in tumbled turkey breast meat. Nitrate concn. in raw turkey breast meat ranged from 3.8 to 21 p.p.m. and nitrite varied from 0 to 7 p.p.m. Microorganisms in the tumbled turkey converted the nitrate to nitrite, 5.2 p.p.m. of nitrite (sodium nitrite) were formed from 100 p.p.m. of added nitrate (potassium nitrite) during 4 h of storage at 4°C . It was concluded that addition of high amount of nitrate and long storage period increased the development of a pink colour in the oven-roasted product. MVG

- 2396 Barbut (S), Maurer (AJ) and Lindsay (RC). Effects of reduced sodium chloride and added phosphates on physical and sensory properties of turkey-frankfurters. *Journal of Food Science* 53(1); 1988; 62-66
- 2397 Smith (DM) and Alvarez (VB). Stability of vacuum cook-in-bag turkey breast rolls during refrigerated storage. *Journal of Food Science* 53(1); 1988; 46-48, 61

The results of this study indicate that physicochemical changes in vacuum packaged, uncured turkey breast rolls prepared commercially in two plants by the cook-in-bag process were small during 87 days storage at 4°C . No significant effect was seen for total product wt., drained wt., pH, nonprotein nitrogen, and tensile strength of turkeys. Shear strength decreased while thiobarbituric acid numbers increased slightly in the turkey rolls. Hunter a colour values of turkey slices varied inconsistently during storage. No psychrotrophic aerobic colony forming units were detected. The commercial pasteurization treatment received by the turkey rolls was insufficient to destroy all the mesophilic anaerobes, thus precautions should be taken to ensure vacuum cook-in-bag poultry products are not temp. abused. BV

- 2398 Wu (TC) and Sheldon (BW). Flavour components and factors associated with the development of off-flavours in cooked turkey rolls. *Journal*

of Food Science 53(1); 1988; 49-54

The influence of storage and roll position on the development of warmed-over flavours in cooked turkey rolls was investigated. A rapid analytical method based on headspace GC to follow the development of oxidized (WOF) off-flavours in cooked turkey rolls was employed. Volatiles separated by capillary gas chromatography were identified by GC-MS and their relative concn. correlated with sensory panel findings which identified both acceptable and off-flavour (WOF) notes in cooked turkey rolls. TBA numbers increased significantly by 52 and 165% after 4 days in the interior and exterior portions of the rolls, resp. and were correlated with flavour deteriorations. Thirty-two compounds were identified, 30 of which are potential products of fatty acid autoxidation. This study also showed the evidence on the possible role of dimethyl disulphide in contributing to the desirable fresh cooked turkey flavours in cooked turkey rolls. RV

- 2399 Wu (TC) and Sheldon (BW). Influence of phospholipids on the development of oxidised off-flavours in cooked turkey rolls. Journal of Food Science 53(1); 1988; 55-61

Total lipid and phospholipid (PL) fractions and their fatty acid profiles were analyzed from the interior and exterior portions of cooked turkey breast rolls. Compositional changes during refrigeration were related to oxidative degradation as measured by the TBA test. Breast tissues contained 2% lipid which remained constant over storage. The PLs constituted 0.7% of the meat and only those PLs in the exterior portion degraded during storage. TBA values increased in both roll portions with a concomitant reduction in polyunsaturated fatty acids (PUFAs) having four or more double bonds. These findings suggested that PUFAs were associated with oxidized off-flavours in cooked turkey rolls. Phosphatidylcholine was present in the highest concn. and underwent the greatest oxidative deterioration. AS

Poultry products

Eggs

- 2400 Barbut (S), Arrington (LC) and Maurer (AJ). Hard-cooked egg shelf life. Poultry Science 66(12); 1987; 1941-1948

The shelf life of hard cooked eggs stored under simulated home condition was studied. Result showed that hard cooked eggs should be stored in their shells in the home refrigerator and the shells removed just prior to using the eggs. This minimised postcooking contamination which could come from different sources such as improper cleaning equipment, poor hand washing or poor quality water supply. Properly handled hard cooked eggs could be stored up to 3 wk. Storing hard cooked, peeled eggs in water or 0.1% benzoate solution was no advantageous. MVG

- 2401 Kitabatake (N), Shimizu (A) and Doi (E). Protein components precipitated from egg white by removal of salt. Journal of Food Science 53(1); 1988; 292-293

A precipitate that formed in egg white at low ionic strength affected the transparency of heat-induced gels prepared at pH 2-4 and low ionic strength. The precipitate solubilized with SDS solution containing 2-mercaptoethanol and urea included major proteins of the egg white, as shown by SDS-polyacrylamide gel electrophoresis. The bands of ovalbumin, conalbumin and other protein were smaller when the precipitate was washed with water, but lysozyme and ovomacroglobulin probably remained in the precipitate fraction. It seemed that ovalbumin, conalbumin, and other proteins co-precipitated with these two kinds of proteins. Lysozyme added to the supernatant of egg white after dialysis, did not appear to produce turbidity upon heating at pH 2.5, but whole egg white was converted to a turbid gel upon being heated at this pH. AS

SEAFOODS

Fish

- 2402 Bremner (HA), Olley (J), Statham (JA) and Vail (AMA). Nucleotide catabolism: Influence on the storage life of tropical species of fish from the North West shelf of Australia. *Journal of Food Science* 53(1); 1988; 6-11

The storage life of four sp. of fish from the North West shelf of Australia has been related to the rate of 1 mp breakdown rather than to bacterial spoilage, because the endemic mesophilic bacteria were unable to adapt to ice storage conditions. Results indicate that the 1 MP level is fundamentally related to both flavour intensity and acceptability and is not merely circumstantially related through time of storage. BV

- 2403 Neelakantan (B), Prasad (PN) and Vinayak (V). Chemical composition of some of the edible fishes of Karwar. *Science and Culture* 54(7); 1988; 242-243

Proximate composition of less used fish sp. (*Thryssa dussumieri*, *T. mystax*, *Pomadasyas maculatus*, *P. hasta*, *Otolithes ruber* and *Johnius vogleri*, was determined. The range of values on % wet wt. basis were: fat 4.50 to 6.55, ash 1.10 to 1.55, protein 16.13 to 17.60 and carbohydrates, 0.31 to 0.38. KAR

- 2404 Rajendra Badonia (R) and Ramachandran (A). Observation on water and ice quality used for fish processing in Veraval. *Seafood Export Journal* 20(8); 1988; 15, 17, 19-20

Large number of samples of water and ice were collected to assess microbiological and chemical qualities in Veraval, Gujarat, (India). The water collected from the fish processing plants showed a total plate count of $26-3.09 \times 10^3$ ml; total coliform count ranged from nil to $> 542/100$ ml. In more than 50% of the samples *E. coli* was absent and in the remaining samples the range was 2 to 48/ml. Fecal

streptococci was absent in most of the cases and only one out of ten cases showed the presence of fecal organisms. Coagulase positive staphylococci was present between 0 to 30/ml. Ice samples collected from processing plants and commercial ice factories showed total plate count of 3.0×10^3 - 3.2×10^3 ml. *E. coli* was absent in > 60% samples and in others it ranged from nil to 400/ml. Fecal streptococci was absent in 80% of the samples and its count was from nil to 400/ml. Total coliform in ice were 542/100 ml. KAR

- 2405 Sawyer (FM), Cardello (AV) and Prell (PA). Consumer evaluation of the sensory properties of fish. *Journal of Food Science* 53(1); 1988; 12-18, 24

A set of 13 sensory attributes for describing cooked fish were identified using data from written surveys and consumer tests. These attributes were applied to the evaluation of 18 common Atlantic species by consumers. The data showed high positive correlations with data previously reported for trained profile panels. The best correlations occurred for the most salient attributes, and cluster analysis for the two sets of data showed the greatest similarity for sp. possessing these salient attributes. However, regression analysis showed that trained profile panelists used a wider range of the intensity scale than did consumers. Corresponding data from a written survey of "experts" correlated poorly with both trained and consumer panel data. AS

- 2406 Shenoy (AS). Scope for export of diversified products from low cost fish. *Seafood Export Journal* 20(9); 1988; 5-7, 9

This article reviews aspects like need for diversifications; diversified seafood items available for utilization including the products developed by Research Institutions; market for new products; modification needed in processing and packaging for exporting of new products; and the possible assistance available from foreign agencies. MVG

Crawfish

- 2407 Marshall (GA), Moody (MW) and Hackney (CR). Differences in colour, texture, and flavour of processed meat from red swamp crawfish (*Procambarus clarkii*) and white river crawfish (*P. acutus acutus*). *Journal of Food Science* 53(1); 1988; 280-81

No significant difference was detected by sensory evaluation using triangle tests. Analysis of Instron Kramer shear force values showed no significant difference in meat texture. Colour analysis of meat and hepatopancreas by Hunterlab colorimeter showed highly significant differences ($P < 0.0005$) in L-values and a-values between the species. BV

Mackerels

- 2408 Rutman (M), Aguilera (JM) and Bisso (G). Properties of dark and light tissue from horse mackerel (*Trachurus murphyi*). *Journal of Food Sci-*

ence 53(1); 1988; 284-285, 289

Mechanical and physical properties of light and dark tissues from horse mackerel (*Trachurus murphyi*) were determined for tissue separation. Raw dark tissue was 1.8 times harder than raw white (1.4 and 0.79 kg-f/g, resp.). Hardness after heating to 20 °C decreased slightly but it increased sharply to a value of about 2.4 kg-f/g at 40 °C. Tensile strength force of the interfibrillar matrix (connective tissue) was also attained at that temp. Pieces of light muscle were denser ($d = 1.082$) than those of dark tissue ($d = 1.059$) and relative separation was attained based on terminal velocities. Heating at 30 °C appeared adequate to implement future mechanical disruption processes. AS

Pollack

- 2409 Park (JW), Lanier (TC) and Green (DP). Cryoprotective effects of sugar, polypols, and/or phosphates on Alaska Pollack surimi. *Journal of Food Science* 53(1); 1988; 1-3

This study compares the cryoprotective effects of sugar and/or polyalcohol, including a starch hydrolysate product, and/or phosphates against freeze-induced protein denaturation of pollack surimi. Polydextrose appeared to substitute for the sucrose/sorbitol now used in surimi manufacture without changes in cryoprotective effect. The maltodextrin adversely affected gel-forming properties, although it maintained the salt-soluble protein extractability nearly as well as did sucrose/sorbitol or polydextrose. The cryoprotective effects of phosphate addition seemed to depend upon pH and/or specific phosphate ion used. BV

Red drum

- 2410 Jahncke (M), Hale (MB), Gooch (JA) and Hopkins (JS). Comparison of pond-raised and wild red drum (*Sciaenops ocellatus*) with respect to proximate composition, fatty acid profiles, and sensory evaluations. *Journal of Food Science* 53(1); 1988; 286-287

The proximate compositions and sensory characteristics were similar for pond-raised and wild red drum. The pond-raised red drum had higher linoleic acid and lower docosahexaenoic acid concn. than the wild fish samples. The eicosapentaenoic acid concn. were similar in both pond-raised and wild red drum. BV

Mussels

- 2411 Casales (MR), Del Valle (CE) and Soule (CL). Heat penetration in canned mussels during agitated retorting. *Journal of Food Science* 53(1); 1988; 4-5

Heat penetration to cans of mussels in brine processed in an agitating retort was studied. The heating lag factor, j , and the time for the heating curve to traverse a log cycle, b , as a function of the rotational speed, the headspace presence, and the come-up time

were determined. Heat penetration rates increased with end-over-end rotation at low rotational speeds. The presence of headspace produced significant improvements in heat penetration. Transient temp. profiles for this product were relatively short; therefore, improvements in heat penetration would only be significant when retort come-up times are short. AS

- 2412 Casales (MR), Del valle (CE) and Soule (CL). Changes in composition of mussels due to thermal processing. *Journal of Food Science* 53(1); 1988; 282-283

Studies were conducted to establish the time-temp. conditions required to achieve different F values and to determine the influence of various thermal processes on the composition and sensory properties of canned mussels in brine. The changes in protein or amino acids contents were found to be similar. BV

Oysters

- 2413 Hackney (CR), Sanders (L), Rippen (T) and Reily (L). Improved method for determination of salt in oysters by direct titration of chloride ion. *Journal of Food Science* 53(1); 1988; 288-289

A comparative study of detn. of salt in oysters by direct titration of the chloride ion, using 0.171 N silver nitrate and dichlorofluorescein as an indicator, was made with the AOAC, back titration procedure. The direct titration procedure is simple accurate method for determining salt in oysters and could be done in-plant. No significant differences were observed between methods; however, the direct titration method was more reproducible at salt concn. of < 0.5%. BV

Shellfish

- 2414 Tardio (JL), O'Brien (K) and Latt (T). Identification of *Escherichia coli* from shellfish related environments by automicrobic system. *Journal of the Association of Official Analytical Chemists* 71(3); 1988; 582-584

A total of 463 fecal coliform positive isolates obtained from shellfish and related samples gave typical *Escherichia coli* IMVIC reactions. *E. coli* identification for 458 (99%) of these isolates were confirmed using a combination of the Automicrobic system (AMS) and the API 20E system (reference system). The AMS (test system) identified 433 isolates as *E. coli*, the remaining 25 (5%) isolates were identified as *E. hermannii* by the test system and as *E. coli* by the reference system. Additional tests performed on the isolates identified as *E. hermannii* confirmed their AMS identification to be incorrect. AS

PROTEIN FOODS

Infant foods

- 2415 Scott (FW) and Hatina (G). HPLC determination of sugars, starch and oligosaccharides in infant formulas using resin-based, fixed-ion columns. *Journal of Food Science* 53(1); 1988; 264-269.

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Alcoholic beverages

- 2416 Canas (BJ), Havery (DC) and Joe (FLJr). Rapid gas chromatographic method for determining ethyl carbamate in alcoholic beverages with thermal energy analyzer detection. *Journal of the Association of Official Analytical Chemists* 71(3); 1988; 509-511

A rapid column elution method has been developed for the detn. of ethyl carbamate (EC) in alcoholic beverages. The beverage is mixed with Celite and packed in a column containing deactivated alumina capped with a layer of sodium sulphate. EC is then eluted with methylene chloride. The method, using a gas chromatograph-thermal energy analyzer with a nitrogen converter for detection and quantitation of EC, has been applied to a variety of alcoholic beverages. Recoveries plus or minus standard deviations of EC in wine and whisky fortified at the 20 and 133 μ /kg (p.p.b) levels averaged 87.3 plus or minus 5.3 and 88.7 plus or minus 3.6% resp. The method has a limit of detection of 1.5 p.p.b. Gas chromatography/mass spectrometry was used to confirm the identify and quantitation of EC in selected beverage extracts. AS

Beer

- 2417 Kindrake (JA). Evaluation of NBB anaerobic medium for beer spoilage organisms. *Technical Quarterly, Master Brewers' Association of the Americas* 24(4); 1987; 146-151

This paper highlights practical elements of yeast management to ensure the highest standards of beer quality are produced. The topics discussed include yeast culture (from single cell to brewery fermentation; yeast handling and storage harvesting, storage, and repitching) and waste yeast and beer recovery (collection of beer from waste yeast and disposal of yeast cake). BV

Brewing

- 2418 Lincoln (RH). Computer compatible parametric equations for basic brewing computations. *Technical Quarterly, Master Brewers' Association of the Americas* 24(4); 1987; 129-132

Wines

- 2419 Benavent (JJA). Influence of the vinification conditions on glycerol and 2, 3-butanediol contents in white dry wine of muscat grapes. *Revista de Agroquímica y Tecnología de Alimentos* 27(2); 1987; 225-230

The influence of the must-clearing conditions, the initial correction of must acidity and the fermentation temp. on glycerol and 2, 3-butanediol contents was studied, using eight dry muscat wines from the same grapes but made up by different processes. Results showed a significant influence ($P < 0.01$) of the sulphur dioxide concn. in the must-clearing operation on the contents of both polyalcohols and significant correlations between the three variables considered. AS

- 2420 Cartesio (MS) and Campos (TV). Malolactic fermentation in wine. Improvement in paper chromatographic techniques. *American Journal of Enology and Viticulture* 39(2); 1988; 188-189

- 2421 Casp (A) and Bernabeu (A). Sensorial characterisation of wines with "Appellation d'Origine" Valencia. I. Red wines. *Revista de Agroquímica y Tecnología de Alimentos* 27(2); 1987; 237-242

Sensory characteristics of 16 bottled red wines with "Appellation d'Origine" Valencia were studied by multivariate statistical analysis. Results show that wines commercialized by important exporting trade marks obtained the best scores for all considered sensory attributes. Judges almost completely identified taste quality with overall acceptance, the latter being poorly correlated with all remaining sensory characteristics. AS

- 2422 Casp (A) and Bernabeu (A). Sensorial characterisation of wines with "Appellation d'Origine" Valencia. "Rose" and white wines. *Revista de Agroquímica y Tecnología de Alimentos* 27(2); 1987; 243-250

Sensorial characteristics of "Rose" and white wines (14 and 16 trade marks of each) with "Appellation d'Origine" Valencia were determined and data analyzed using multivariate statistical techniques. Wines are satisfactorily characterised and the most important sensorial attributes for wine differentiation determined. In "rose" wines predominated on one hand attributes related with taste and on the other hand those related with colour and aroma. In white wines a clear separation between those attributes related with taste quality and aroma quality and all other attributes was observed. Overall acceptance was mainly influenced by taste quality, as it was found in red wines, with a lesser influence of some other attributes. Thus, in "rose" wines aroma intensity was of certain importance where as colour, acidity and taste intensity (the latter, with a negative effect) influenced overall acceptance of white wines. Important export trade marks obtained higher scores in both "rose" and white wines than local companies. AS

- 2423 Clark (JP), Fugelsang (KC) and Gump (BH). Factors affecting induced calcium tartrate precipitation from wine. *American Journal of Enology and Viticulture* 39(2); 1988; 155-161

The rate of calcium tartrate precipitation was measured in wine after addition of calcium carbonate. Wine pH has little if any, effect on the rate of precipitation, only on the final equilibrium concn. Low temp. slower the rate of precipitation but result in greater calcium tartrate stability. Addition of calcium tartrate seed crystals increases the rate of precipitation. Malic acid inhibits calcium tartrate precipitation during the period when nucleation controls crystal growth. Measurement of tartaric acid and Ca during precipitation shows the stiochiometry to be 1:1 during all phases of crystallization. AS

- 2424 Davis (CR), Wibowo (D), Fleet (GH) and Lee (TH). Properties of wine lactic acid bacteria. Their potential enological significance. *American Journal of Enology and Viticulture* 39(2); 1988; 137-142

Lactic acid bacteria isolated from Australian red wines were examined for properties of potential enological significance. Some 166 strains were tested. Strains of *Leuconostoc oenos* were divided into rough and smooth morphotypes on the basis of colony appearance. Rough morphotypes produced cells arranged in long chains and readily grew in wine. Smooth morphotypes produced cells arranged in pairs or short chains, but most of these strains exhibited poor growth in wine. As tested in API 50CH galleries (pH 6.0) strains of *L. oenos*, *Pediococcus parvulus*, and several *Lactobacillus* species exhibited considerable heterogeneity in their abilities to ferment carbohydrates. The fermentation profile of individual strains was altered when the pH was reduced to 4.0. Strains of *L. oenos* were more tolerant of low pH than those of *P. parvulus* or *Lactobacillus* sp. Strains of *P. parvulus* and *Lactobacillus* sp. were more tolerant of high concn. of ethanol and total sulphur dioxide. None of the strains produced extracellular protease. Lipases were produced by several strains of *L. oenos* and one strain of *Lactobacillus*. The majority of strains produced esterases. AS

- 2425 Drysdale (GS) and Fleet (GH). Acetic acid bacteria in winemaking. *American Journal of Enology and Viticulture* 39(2); 1988; 143-154

This review discusses the ecology, growth, and metabolic behaviour of acetic acid bacteria on the grape and in musts and wine, along with the changes they cause to wine composition. 167 references. MSP

- 2426 Harvey (JM), Harris (CM), Hanke (TH) and Hartsell (PL). Sulphur dioxide fumigation of table grapes. Relative sorption of sulphur dioxide by fruit and packages, sulphur dioxide residues, decay and bleaching. *American Journal of Enology and Viticulture* 39(2); 1988; 132-136

Table grapes are fumigated with sulphur dioxide to control decay during storage and marketing. The efficacy of the treatment is affected by the type of packaging material used. Most fumigation schedules in commercial use were developed for grapes packed in wooden or wood/kraft veneer (WKV) boxes. In lab. exp. grapes packed in

expanded polystyrene foam (EPF) boxes sorbed Ca 50% less sulphur dioxide as did those in WKV boxes; grapes packed in fiber board boxes sorbed Ca 50% more sulphur dioxide than did those in WKV boxes. Adjusted fumigation dosages were developed that compensated for sorption by packaging materials and provided comparable concn. $\times$ time (CT) products in the fumigation chamber. Free sulphur dioxide residues in grapes packed in the three types of boxes and treated with the adjusted dosages were similar (0.11, 0.13 μ /g); total sulphur dioxide residues were 2.3, 1.8, and 1.0 μ /g in grapes packed in WKV, EPF, and fiberboard boxes, resp. All residues were below a proposed tolerance of 10 μ /g. The adjusted schedules had comparable effects on decay control, stem condition, and bleaching of the berries. AS

- 2427 Huang (P-JD), Cash (JN) and Santerre (CR). Influence of stems, petioles and leaves on the phenolic content of Concord and Aurora blanc juice and wine. *Journal of Food Science* 53(1); 1988; 173-175

- 2428 Lamikanra (O) and Inyang (ID). Temperature influence on Muscadine wine protein characteristics. *American Journal of Enology and Viticulture* 39(2); 1988; 113-116

Muscadine wine proteins were characterised on the basis of their isoelectric points and mol. wt. Two dimensional gel electrophoresis of the protein extracts from Carols and Welder wines resulted in bands with mol. wt. between 12 000 and 50 000 daltons, and their isoelectric points ranged from 4, 6 to 8.8. A protein stability test in which the wines were stored at 49 C (120 F) for four days showed that some protein bands, especially those with mol. wt. above 32, 000 daltons, were unstable. Changes in protein configuration during fermentation are suggested by the fact that while the mol. wt. of some protein bands in the wines were the same as those found in their juices, their isoelectric points differed. Similar observations were made when the wines were stored at 49 C. Browning of wines, which occurred when the wines were kept at this temp. was effectively inhibited by potassium metabisulphite. Tiron and EDTA had no effect on the browning reaction, which suggests a non-homolytic reaction pathway, possibly a Maillard-type reaction. AS

- 2429 Maquieir (A), Dolores Luque de Castro (MD) and Valcarcel (M). Determination of reducing sugars in wine by flow injection analysis. *Analyst* 112(11); 1987; 1569-1572

Three automatic flow injection method for the detn. of reducing sugars in wine based on classical reactions (the picric acid method, the Cu^{II}-neocuproine method and Nelson-Somogyi method) are proposed. Their usefulness was tested by applying them to white and red wines. The results obtained agree with those provided by a batch standard method. The standard additions procedure yielded recoveries above 94.2% in all instances. AS

- 2430 Millan (C) and Ortega (JM). Production of ethanol, acetaldehyde and acetic acid in wine by various yeast races. Role of alcohol and aldehyde dehydrogenase. *American Journal of Enology and Viticulture* 39(2); 1988; 107-112

- 2431 Noble (AC), Strauss (CR), Williams (PJ) and Wilson (B). Contribution of terpene glycosides to bitterness in Muscat wines. *American Journal of Enology and Viticulture* 39(2); 1988; 129-131

Terpene glycosides were isolated from a bitter Muscat of Alexandria wine. When the glycosidic extract was added to a model system or to wine at levels one and two times the concn. in the original wine, no significant difference in taste was produced, whereas in water at single-concn. a significant difference was produced ($P < 0.05$) which was described as a faint fruity or floral flavour. When evaluated in water at ten times the wine concn. the glycosidic extract produced a low-intensity bitter taste, which was of the magnitude of that elicited by 2 mg/L quinine. It may be concluded that the terpene glycosides do not contribute to bitterness in Muscat wines. AS

- 2432 Rodriguez-Clemente (R) and Correa-Gorospe (I). Structural, morphological and kinetic aspects of potassium hydrogen tartrate precipitation from wines and ethanolic solutions. *American Journal of Enology and Viticulture* 39(2); 1988; 169-170

The morphology of potassium hydrogen tartrate (KHT) crystals precipitated from ethanol-water solutions and from white wines from the Penedes (Spain) is reported. In each case, the rate of precipitation is influenced by agitation, supersaturation and temp. Precipitation of KHT from wines differs from that from ethanol-water solutions because of impurities which affect growth and final crystal morphology. Crystal structure data, the equilibrium forms, and the growth forms of KHT are defined, and a model of impurity-crystal surface interaction has been proposed to explain crystal formation through the precipitation process and the growth process. AS

Non-alcoholic beverages

Fruit juices

Apple juices

- 2433 Agarwal (VK). Simultaneous determination of D- and L-malic acids in apple juice by gas chromatography. *Journal of the Association of Official Analytical Chemists* 71(3); 1988; 466-468

A gas chromatographic (GC) method was developed for the simultaneous detn. of D- and L- malic acids in apple juice. D-Malic (R)-(-)-2-butyl ester and L-malic-(R)-(-)-2-butyl ester are prepared with (R)-(-)-2-butanol. These diastereomers are separated and quantitated by GC on a Carbowax 20M (30 m x 0.25 mm) fused silica capillary column. This procedure does not involve any extraction or cleanup step. AS

Grapefruit juices

- 2434 Lee (HS) and Nagy (S). Quality changes and nonenzymic browning intermediates in grapefruit juice during storage. *Journal of Food Science* 53(1); 1988; 168-172, 180

Effects of storage temp. and time on the quality of commercially canned grapefruit juice were investigated. The most noteworthy and reproducible trend observed by HPLC was a significant increase in concn. of 5-hydroxymethylfurfural and furfural with increased storage temp. During storage over 50% of sucrose was hydrolyzed after 6 wk at 30 °C, and the reducing sugars increased in accordance with hydrolysis of sucrose. In the juice stored at 50 °C, more than 98% of the ascorbic acid, and about 9% of total sugars were lost. Lightness value of juice decreased continuously during storage. AS

Orange juices

- 2435 Carter (RD) and Barros (SM). Flavour evaluation of Florida frozen concentrated orange juice blended from concentrates produced with varying extraction yields. *Journal of Food Science* 53(1); 1988; 165-167, 184
- 2436 Perfetti (GA), Joe (FLJr), Fazio (T) and Page (SW). Liquid chromatographic methodology for the characterisation of orange juice. *Journal of the Association of Official Analytical Chemists* 71(3); 1988; 469-473

Liquid chromatography has been used to obtain a profile of the visible and UV-absorbing substances in orange juice. Data on 80 authentic and 19 adulterated samples were analysed using computer pattern recognition analysis. Using this, it was possible to detect adulteration of orange juice with grapefruit juice or pulp washing. MNK

- 2437 Pino (JA), Ranivoelisoa (V) and Torricella (R). Effect of temperature on shelf life of bottled orange juice. *Revista de Agroquímica y Tecnología de Alimentos* 27(2); 1987; 261-269

Quality retention of hot filled bottled juice from Valenica orange was studied during storage at different temp. (10, 20, 28, 30 and 40 °C). The juice showed a good level of acceptance only at temp. below 20 °C, since analytical parameters (ascorbic acid, furfural, colour and volatile constituents) and sensorial quality did not change significantly during the first 6 months of storage. A significant loss of quality was observed after one month at room temp. (28 plus or minus 2 °C). The ascorbic acid loss has been interpreted as zero order reaction and fits in the Arrhenius equation in the studied temp. range. It was confirmed that furfural and Alpha terpineol contents could be considered as indicators of orange juice ageing due to their highly significant correlations with sensorial quality. AS

- 2438 Wicker (L) and Temelli (F). Heat inactivation of pectinesterase in orange juice pulp. *Journal of Food Science* 53(1); 1988; 162-164

Heat inactivation of pectinesterase in juice pulp was nonlinear suggesting the presence of fractions of pectinesterase with differing heat stabilities. The residual activity rapidly decreased to 4% upon heating for 19 sec at 80 °C and decreased very little upon subsequent heating for up to 180 sec at 80 °C. The D values (time to inactivate

90% of the enzyme) at 90 °C of the heat sensitive and heat stable fractions were estimated to be 0.225 and 32 sec. resp. The Z values (change in temp. to achieve at 10-fold change in time of inactivation) were estimated to be 10.8 °C and 6.5 °C for the sensitive and stable fractions, resp. AS

Soft drinks

- 2439 Lau (O-W), Luk (SF) and Chan (W-M). Spectrophotometric determination of aspartame in soft drinks with ninhydrin as reagent. *Analyst* 113(5); 1988; 765-768

A simple spectrophotometric method has been developed for the detn. of aspartame, based on reaction of aspartame with ninhydrin. The precision of the procedure was checked calculating the relative standard deviation of the replicate detn. on a cola sample containing 680 µg ml⁻¹ of aspartame. Many common ingredients of soft drinks do not interfere. N

Tea

- 2440 Horita (H). Off-flavor components of green tea during preservation. *JARQ (Japan Agricultural Research Quarterly)* 21(3); 1987; 192-197

In this investigation the off-flavour components of green tea formed during preservation or storage under different conditions of packaging or light exposure by using GC and GC/MS analyses of aroma concn. prepared from off flavour teas and by sensory evaluation of the teas is described. The changes of aroma components of green tea 1-penten-3-ol, (Z)-2-penten-1-ol, (E, Z)-2, 4-heptadienal (E, E)-2, 4-heptadienal stored at 5 °C and 25 °C showed that the increase in these components at 5 °C is small as compared to that at 25 °C storage. It is also seen that the deterioration flavour having an acidic note is due to the remarkable increase of acetic acid. The sunlight flavour of green tea is stimulative, metallic and cabbage like odour which also may be ascribed to sulphurous compounds. NGKR

- 2441 Jackson (LS) and Lee (K). Chemical forms of iron, calcium, magnesium and zinc in black, oolong, green and instant black tea. *Journal of Food Science* 53(1); 1988; 181-184

- 2442 Julkunen-Tiitto (MRK), Kirsi (MJ) and Rimpilainen (TK). Methods of analysis and the aroma composition of some species of herbal teas. *Lebensmittel-Wissenschaft und-Technologie* 21(1); 1988; 36-40

Twenty-six contributory components were screened in six Finnish herbal tea plants by capillary gas chromatography. Each species showed the sp. specific aroma composition. The most abundant aroma constituents were trans-2-hexenal, benzaldehyde, phenylacetaldehyde, Alpha pinen, octanoic acid and phenethylalcohol. The aroma profile by withering and rolling followed by fermentation was markedly affected. The concn. of benzaldehyde and the undesirable aroma compounds, trans-2-hexenal and cis-3-hexenol decreased sharply, while the higher-boiling point aroma ingredients and intermediates accumu-

ated during fermentation. AS

FATS AND OILS

- 2443 Inomata (Y). Vending machine existing condition and future direction in drink market. *Packaging Japan* 9(46); 1988; 23-29

Fats

- 2444 Hagemann (JW) and Rothfus (JA). Effects of chain length, conformation and Alpha-form packing arrangement on theoretical monoacid triglyceride Beta-forms. *Journal of the American Oil Chemists' Society* 65(4); 1988; 638-646

Theoretical Beta-form monoacid triglycerides of odd and even chain length having a bend in the glycerol region were prepared by bond rotations from selected Alpha-form conformers. The shapes of such Beta-forms depend on the bonds rotated and the direction of rotation. Intermolecular minimization procedures determined best-fit positions around a centralised mole, which revealed unsymmetrical packing among five of nine different energetically-favoured orthorhombic subcell arrangements. Methyl gap energy is influenced more by overall triglyceride conformation than by whether the fatty acid chains have an odd or even number of carbon atoms. Total lattice-packing energies varied little between odd and even chain lengths; thus, many combinations of conformation and subcell arrangement are consistent with known X-ray long spacings and polymorphic behavior of Beta-forms. AS

- 2445 Madaan (TR). Quantitative estimation of saturated mono- and diunsaturated fatty acids in natural fats. *Journal of the Oil Technologists' Association of India* 19(2); 1987; 50-51

A simple oxidative method for determining absolute proportions of mono- and diunsaturated fatty acids in natural fats has been developed. The method is applicable to fats containing C₁₈ and higher mono- and diunsaturated fatty acids. It also determines the amount of saturated fatty acids present in the fat. Fatty acid composition of 10 seed fats has been determined. Using this method and the values for saturated fatty acids, lower mono basic acids, monounsaturated acid, dibasic acid, total unsaturated acid, and non-glyceride matters have been reported. In the seeds fats of *Garcinia cambogia* and *Carica papaya* the proportions of monounsaturated acids measured by this new method and total unsaturated acid measured by DBA method were the same which showed that the method was capable of quantitatively isolating and estimating lower mono basic acids contents without any loss due to volatilisation and/or washing with 2% NaCl solution. KAR

- 2446 Nusrath Nasir and Nagaraja (KV). Loss of vitamin A in vanaspati under different storage conditions. *Journal of the Oil Technologists' Association of India* 19(2); 1987; 44-46

Effect of light, heat (8, 20-37 and 37 C), packages (plastic, tin and glass) and oxidation products on the loss of vitamin A was studied for a period of 6 months under tropical conditions. The loss of vitamin A was gradual at lower temp. and faster at higher temp. The loss was fastest in glass and slowest in plastic container, but at 37 C the loss was much faster for the sample stored in tin containers. With the decrease in vitamin A content, the peroxide value increased. The loss of vitamin A during storage was 17.4, 20.5 and 21.5 IU/g at 8 C, ambient temp. (20-37 C) and 37 C resp. It was suggested that atleast 20 IU/g of extra vitamin A may be added at the time of vanaspati production. KAR

- 2447 Shah (SG) and Subrahmanyam (VVR). Physical behaviour of four non-traditional hard fats. Journal of the Oil Technologists' Association of India 19(2); 1987; 45-48

The physical properties/saturated acid content, GS content, melting point, solidification behaviour, hardness and SFT of Areca (*Areca catechu*) fat alone and its blends (3:1) with butter fat, cocoa butter and coconut oil were compared with those of Pisa (*Actinodaphne hookeri*), Phulwara (*Madhuca butyraceae*) and mango kernel (*Mangifera indica*) fats. Blends of areca fat melt between 37.0 to 37.7 C, all of these are hard upto 30 C but still melt at about the body temp. They resemble cocoa butter in hardness between 15 and 30 C but have wider plastic range than cocoa butter and have very rapid melt down properties. Areca-coconut oil blends having similar physical properties appear to be attractive fat bases for warmer climates and will have good stability. KAR

Fatty acids

- 2448 Gangadhar (A), Subbarao (R) and Lakshminarayana (G). Cyclopropanation of unsaturated fatty acid methyl esters using diazomethane and palladium (II) acetate. Journal of the American Oil Chemists' Society 65(4); 1988; 601-606

Cyclopropanation of methyl esters of 10-undecenoic, oleic, elaidic, erucic, trans-2-docosenoic and a mixture of hydnocarpic and chaulmoogric acids was effected using diazomethane in the presence of palladium (II) acetate as catalyst. The products were isolated by silver ion thin-layer chromatography and characterized by infrared, proton nuclear magnetic resonance and mass spectrometric techniques. Terminally unsaturated, Alpha, Beta-unsaturated and cyclopentene fatty acid esters were found to be more reactive than elaidate which in turn was more reactive than oleate. The reaction proceeds stereospecifically under milder conditions in a shorter time than with diiodomethane and zinc-copper couple. AS

Salfat

- 2449 Bajpai (M) and Vanishta (AK). Directed interesterification of sal (*Shorea robusta*) fat. Journal of the Oil Technologists' Association of India 19(4); 1987; 76-78

Sal fat was interesterified using sodium methoxide catalyst as such and also in solution in n-hexane. The slip point of the original fat increased from 33.0 to 39.5 °C after randomisation in the oil phase; a slip point of 51.5 °C was obtained after 72 h of direct interesterification in the oil phase. During interesterification of the fat in solution in the hexane (1:1 W/W) a sharp rise in the slip point from 33.0 to 42.5 °C was observed. The interesterification in the oil phase resulted in a steady rise in the saturated triglyceride content of fat subjected to randomisation and directed interesterification. The disaturated-monounsaturated triglyceride content of the fat decreased steadily and simultaneously during randomisation and directed interesterification. The mono-unsaturated-diunsaturated triglyceride content increased during randomisation but remained static during directed interesterification. During the directed interesterification, there had been a very significant shifting of the fatty acid radicals from the Sn-2 position particularly in oil phase. The migration of the unsaturated fatty acid radicals from the Sn-2 position and saturated fatty acid radicals taking their place is evident. In the case of interesterification in solution in n-hexane, a sharp increase in the content of saturated fatty acids at Sn-2 position was observed during randomisation. However, during the subsequent, directed interesterification at 90 °C the reaction was slow and the rise in saturated acid content at the Sn-2 position was only slight. KAR

- 2450 Bhattacharya (DK) and Samaddar (G). Isolation of starch from sal meal. *Journal of the Oil Technologists' Association of India* 19(2); 1987; 52

Starch was isolated from sal meal by varying the particle size of sal meal, the concn. of steeping solution, (NaOH) and time of steeping. The particle size played an important role in the yield of starch, the particle size of a meal of < 80 µ being superior to sal meal not properly sized. Use of soda ash (0.5% solution) instead of NaOH solution increased the yield significantly. The strength of the alkali solution also influenced the starch yield for example 1.25% NaOH solution gave max. yield. The time of steeping also influenced yield of starch. It was concluded that a good yield of starch (80%) can be obtained by steeping sal meal of particle size < 80 µ in 4 vol. of 1.25% NaOH solution at 30 °C for 90 min. The isolated starch was white to creamy in colour and of good standard quality. KAR

Vanaspati

- 2451 Majumdar (S) and Bhattacharyya (DK). Nutritional quality of interesterified palmolein as vanaspati substitute. *Oleagineux* 43(1); 1988; 29-33

Intesterified palmolein product shows comparatively high coeff. of digestibility. At 20% dietary fat level, the interesterified product shows much reduced triglyceride and slightly more cholesterol in plasma than those of the corresponding hydrogenated vanaspati. Also plasma lipids contain more essential fatty acids when the rats are raised on the interesterified palmolein product. The product can be used as a new kind of vanaspati. RV

Oils

- 2452 Akihisa (T), Inada (Y), Ghosh (P), Thakur (S), Rosenstein (FU), Tamura (T) and Matsumoto (T). Compositions of triterpene alcohols of seeds and mature plants of family Cucurbitaceae. *Journal of the American Oil Chemists' Society* 65(4); 1988; 607-610

Compositions of the triterpene alcohol fractions of the unsaponifiable lipids obtained from 28 seed and mature plant aerial parts (leaves and stems), pericarp of the fruits, and roots of 13 genera of the family Cucurbitaceae were determined by gas liquid chromatography (GLC) on an OV-19 glass capillary column. Among the 14 tetracyclic and pentacyclic triterpene alcohols identified, isomultiflorenol was found to be the major component for most of the seed materials. The abundance of this triterpene suggests that it may be a taxonomical marker of the seeds of Cucurbitaceae since only a few higher plants are known to contain isomultiflorenol. The mature plant materials of the Cucurbitaceae, on the other hand, were shown to contain either one or some of the common triterpene alcohols such as Alpha- and Beta-amyrins, cycloartenol and 24-methylenecycloartanol as the major triterpene constituents. AS

- 2453 Przybylski (R) and Eskin (NAM). A comparative study on the effectiveness of nitrogen or carbon dioxide flushing in preventing oxidation during the heating of oil. *Journal of the American Oil Chemists' Society* 65(4); 1988; 629-633

Cottonseed Oils

- 2454 Sudha (SP) and Subrahmanyam (VVR). Compositional studies on cottonseed and its oils. *Journal of the Oil Technologists' Association of India* 19(2); 1987; 38-40

Forty commercially cultivated cottonseed var. belonging to *Gossypium arboreum*, *G. herbaceum*, *G. hirsutum* and *G. barbadense* sp. were analysed. The average oil content ranged from 19.7 to 23.0% whereas the range in values of gossypol content was 0.64-1.32%. The same var. when cultivated in different places also showed variation in their chemical composition and the oil alone ranged from 19.9 to 21.8%. The composition of the oil was also influenced by the genetic factors as also by environmental factors. KAR

Essential oils

- 2455 Lawrence (BM). Progress in essential oils. *Perfumer & Flavorist* 12(5); 1987; 54-63

Covers *Artemisia vestita* oil, blackcurrent bud oil, fenugreek extract, palmarosa oil and spike lavender oil. BV

Olive oils

- 2456 Mahjoub (A) and Bullerman (LB). Effects of storage time, sunlight, temperature, and frying on stability of aflatoxin B1 in olive oil.

Lebensmittel-Wissenschaft und-Technologie 21(1); 1988; 29-32

The stability of aflatoxin B1 artificially added to crude olive oil was studied during storage, heating, exposure to sunlight, and frying of food samples. More than 50% of aflatoxin B1 was recovered after 224 days of storage in the dark. Exposure to sunlight for 10 and 40 min caused 55% and 95% loss of aflatoxin resp. Heating of olive oil up to 200 C caused little loss. When temp. reached 250 C, aflatoxin loss was about 65%. The amounts of aflatoxin detected in the fried foods were much higher than the theoretical amounts of toxin contained in the amounts of oil absorbed by the food samples, suggesting that certain food tissues selectively absorb aflatoxin B1. AS

Palm oils

- 2457 Hornstra (G). Dietary lipids and cardiovascular disease. Effects of palm oil. *Oleagineux* 43(2); 1988; 75-87

SPICES AND CONDIMENTS

Condiments

Mayonnaise

- 2458 Gomez-Lucie (E), Goyache (J), Blanco (JL), Garayzabal (JFF), Orden (JA) and Suarez (G). Growth of *Staphylococcus aureus* and enterotoxin production in homemade mayonnaise prepared with different pH values. *Journal of Food Protection* 50(10); 1987; 872-875

The ability of *Staphylococcus aureus* to grow and produce enterotoxins in homemade mayonnaise prepared at different pH values was studied. Ten enterotoxigenic strains, producing one or two enterotoxin type (A, B, C, or D) were inoculated into mayonnaise samples with pH adjusted to values ranging between 4.0 and 5.8, and incubated at 37 C for 7 days. Counts were made on days 1, 3, 5 and 7 and extracts were prepared on day 7 to detect enterotoxin by ELISA. An important difference was seen between those samples prepared with pH below or equal to 4.9 and those over or equal to 5.0., the range of pH between 4.0 and in 4.9 the average of staphylococcal population was 100 CFU/g; at pH 5.0 it was 1.6×10^5 , and at pH 5.15 and above it was at least 8×10^6 CFU/g. Enterotoxin was detected only at initial pH over 5.15 and when final pH was not less than 4.7. The highest amount of enterotoxin corresponded to 157.8 ng of SEB/100 g of mayonnaise. AS

Spices

Garlic

- 2459 Gargi) and Roy (AN). Prevention and control of some post harvest fungal diseases of garlic bulbs. *Pesticides* 22(2); 1988; 11-15

To prevent the bulb rot in stored garlic, caused by fungal

pathogenes such as *Aspergillus ochraceus*, *Fusarium moniliforme* and *Penicillium purpurogenum*, effect of 3 temp. (25, 30 and 35 C) 3 relative humidity (RH% 30, 60 and 90) and 12 fungicides were studied. Avoidance of bruising, storage at 25 C coupled with 30% RH and 100 p.p.m bavistin dip treatment for 8 to 10 min have been recommended. The stored bulbs were protected for 4 months under these conditions. The fungicides evaluated are 1. Agrimycin, 2. Aureofungin, 3. Rosciline, 4. Bavistin, 5. Benlate, 6. Blitox-50 7. Difolatan, 8. Dithane M-45, 9. Dithane Z-78, 10. PCNB, 11. Plantava and 12. Vitavax. NGKK

Ginger

- 2460 Paull (RE), Chen (NJ) and Goo (TTC). Compositional changes in ginger rhizomes during storage. *Journal of the American Society for Horticultural Science* 113(4); 1988; 584-588

Compositional changes in ginger (*Zingiber officinale* Rose) rhizome stored at 22 or 12.5 C were studied. The rhizome surface Hunter "b" value increased from 9.2 to 18 in 4 wks. Water loss did not become significant until 12 wks of storage at 22 C. There was little increase in DM of rhizomes stored at 12.5 C. Rhizome crude fiber content, oil percentage, total phenols, and protein content did not change significantly. Rhizome total sugar increased significantly during storage at 12.5 C for 32 wks with pungency increasing 5-fold, as measured by gingerol content. No significant volatile flavour changes were noted, with rhizome variation being greater than storage effect. The changes in rhizome surface colour did not lead to a significant loss in quality. The increase in pungency could be regarded as a favourable improvement in the fresh ginger market. The loss of water and increase in DM percentage significantly decrease overall appearance and quality of rhizomes stored at 22 C. AS

FOOD STORAGE

- 2461 Hunter (AJ). The variation of static pressure in seed bulk aeration systems involving multiple ducts. *Journal of Agricultural Engineering Research* 39(2); 1988; 107-121

In this paper an attempt is made to understand the flow mechanisms of air in duct systems. An approx. analysis for the variation of static pressure in multiple aeration ducts of differing physical characteristics is done. The analysis has also taken into account components of air velocity in the seed bulk in the direction of the axis of the duct as well as coupling along and between ducts into the analysis of static pressure variation. It is shown that the coupling can make a very significant difference to the static pressure variation and its effect on non uniformity of air flow leaving the duct. RS

INFESTATION CONTROL AND PESTICIDES

Nil

BIOCHEMISTRY AND NUTRITION

Biochemistry

Amino acids

- 2462 Arabshahi (A) and Lund (DB). Thiamin stability in simulated intermediate moisture food. *Journal of Food Science* 53(1); 1988; 196-198

Four different intermediate moisture model systems (IMMS) were designed and prepared to simulate intermediate moisture foods. Stability of thiamin hydrochloride in IMMS as a function of temp., oxygen, water activity, moisture content and composition of the model systems was studied. Analysis of kinetic data indicated that the rates of degradation of thiamin (1) can be represented by a first order model, (2) were not effected by oxygen concn. and presence of riboflavin and niacin, (3) obeyed an Arrhenius relationship for temp. dependence in the range 25-60 C, (4) increased as polarity of the reaction medium decreased, and (5) decreased as water activity increased from 0.65 to 0.85. AS

- 2463 Desrosiers (T), Bergeron (G), Parent (G) and Savoie (L). On the adequacy of methods for the quantitative determination of reactive lysine in the free form or in small peptides. *Journal of Food Science* 53(1); 1988; 290-291

Reactive lysine detn. in mixtures containing lysine in the free form or in small peptides by the 1-fluoro-2, 4-dinitrobenzene(FDNB) procedure is complicated by the fact that both amino groups of lysine can react with FDNB. Quantitative conversion of lysine to its copper salt, followed by reaction with FDNB, has been reported. However, the present study demonstrated the copper complexation was incomplete, even when alanine was added to better protect the free Alpha-amino group of lysine. The FDNB procedure would, therefore, be of questionable value for the detn. of reactive lysine in protein hydrolysates. AS

- 2464 Sheldon (SA) and Shibamoto (T). Volatile compounds produced in L-cysteine/D-glucose model system by sunlight irradiation. *Journal of Food Science* 53(1); 1988; 191-195

Nutrition

- 2465 Anon. Bone mineralization and growth in term infants fed soy-based or cow milk-based formula. *Nutrition Reviews* 46(4); 1988; 152-154

- 2466 Blumenthal (A), Escher (F), Gappisch (F), Holder (B), Lutz (A), Schar (J), Scheffeldt (P), Solms (J) and Streuli (H). On the calculation and presentation of nutrient data. *Lebensmittel-Wissenschaft und-Technologie* 21(1); 1988; 1-7

TOXICOLOGY

- 2467 Lovelotte (C), Barnes (WS), Weisburger (JH) and Williams (GM). Improved synthesis of the food mutagen 2-amino-3, 7, 8 trimethyl-3H-imidazo (4,5-f) quinoxaline and activity in a mammalian DNA repair system. *Journal of Agricultural and Food Chemistry* 35(6); 1987; 912-915

A simplified, direct synthesis of 2-amino-3, 7, 8-trimethyl-3H-imidazo(4,5-f) quinoxaline is described. Reaction of butane-2,3 dione with 4-nitro-1,2 phenylenediamine yielded 87% 2, 3-dimethyl-6-nitroquinoxaline, which in three convenient steps gave 6-(methylamino)-2, 3-dimethylquinoxaline (51% yield). Nitration and separation of the two nitrated isomers provided the needed 5-nitro derivative (42%) that upon catalytic reduction and reaction with cyanogen bromide gave 2-amino-3, 7, 8-trimethyl-3H-imidazo (4, 5-f) quinoxaline in 65% yield. 2-amino-3, 7, 8-trimethyl-3H-imidazo (4, 5-f) quinoxaline has about 50% of the mutagenicity of 2-amino-3-methyl-3H imidazo, (4, 5-f)quinoline (IQ) in *Salmonella typhimurium* TA98 with biochemical activation and also in the Williams test, the induction of unscheduled DNA synthesis in rat hepatocytes. Thus, 2-amino-3, 7, 8-trimethyl-3H-imidazo (4, 5-f) quinoxaline is genotoxic, and most likely carcinogenic, as are most chemicals with reliable activity in both tests. AS

Mycotoxins

Aflatoxins

- 2468 Dixon-Holland (DE), Pestka (JJ), Bidigare (BA), Casale (WL), Warner (RL), Ram (BP) and Hart (LP). Production of sensitive monoclonal antibodies to aflatoxin B₁ and aflatoxin M₁, and their application to ELISA of naturally contaminated foods. *Journal of Food Protection* 51(3); 1988; 201-204

Two new hybridoma cell lines capable of secreting sensitive monoclonal antibodies for aflatoxin B₁ (AFB₁) and aflatoxin M₁ (AFM₁) were produced by fusing NS-1 myeloma cells with spleen cells of BALB/c female mice immunized with AFB₁ AND AFM₁ carboxymethyloxime bovine serum albumin conjugates, resp. Detection limits for these antibodies in the direct enzyme linked immunosorbent assay (ELISA) were 0.5 ng/ml for AFB₁ and 0.25 ng/ml for AFM₁. Conc'n. of AFB₁ analogs (ng/ml) required to inhibit 50% binding of AFB₁ peroxidase conjugate to AFB₁ monoclonal antibody solid phase in direct ELISA were AFB₁ 2.6, AFB₂, 13; AFG₈; AFB₂, 15; AFM₁ 23. Analog conc'n. (ng/ml) required to inhibit 50% binding of AFB₁ peroxidase conjugate to AFM₁ monoclonal antibody solid phase were: AFM₁ 0.8, AFM₂, 700; AFB₁ 0.5; AFB₂, 35; AFB_{2a} > 10.000; AFG₁, 12; AFG_{2a} 12; AFPI, 16; AFQ, 9.2. These new monoclonal antibodies were applicable to both ELISA detection AFB₁ In

corn, cottonseed, cottonseed meal, and mixed feed following a simple extraction in 55% methanol as well as the direct detection of AFM1 in milk. AS

- 2469 Rusul (G). Growth and aflatoxin production by *Aspergillus parasiticus* NRRL 2999 in the presence of potassium benzoate or potassium sorbate and at different initial pH values. *Journal of Food Protection* 50(10); 1987; 820-825

The effect of various pH values plus different concn. of K-sorbate and K-benzoate on growth and aflatoxin production by *Aspergillus parasiticus*, were determined. The effectiveness of the two antifungal agents in controlling mold growth and toxin production was also compared. MVG

Deoxynivalenol

- 2470 Megalla (SE), Bennett (GA), Ellis (JJ) and Shotwell (OL). Production of deoxynivalenol and zearalenone by isolates of *Fusarium graminearum* Schw. *Journal of Food Protection* 50(10); 1987; 826-828

Pesticide Residues

- 2471 Agarwal (RM). Residues of aluminium phosphide in stored foodgrains. *Bulletin of Grain Technology* 26(1); 1988; 71-80

This review covers aspects of fumigation of agricultural produce and food products with aluminium phosphide. The mechanism of action of aluminium phosphide; recommended uses, tolerance limits; methods of residue detn., residues of phosphine in treated commodities; effect on germination of seeds, and organoleptic quality of treated food grains. NGKR

FOOD LAWS AND REGULATIONS

Nil

GENERAL

- 2472 Emery (DF). Good management in the laboratory environment. *Cereal Foods World* 33(6); 1988; 485-488

The basic principles and practices of good management in the technical service laboratory and R & D laboratory were discussed. Standard operating procedures accuracy and reproducibility, appropriate turn around time, productivity, and problem solving ability are the critical factors influencing the success of the technical as well as the R & D laboratory. The components of the good laboratory management are defining of clear objectives organization and staffing, appropriate requirement, good laboratory practices, safety and house keeping, and financial management. PHR

- 2473 Perisse (J) and Kamoun (A). Trends in urban and rural food consumption and implications for food policies in Tunisia. *Food and Nutrition Bulletin* 9(4); 1987; 21-32

FOOD PROCESSING

Drying

- 2474 Anon. Swedish dehydration system saves cost, time and space. *Food Engineering International* 12(9); 1987; 60-63

A connective-conductive drying method (Precision Drying System) is described which can be used to dry a wide range of products including, cereals, eggs, dairy products, fruits, vegetables, soy products, meat, fish, fish paste, high-moisture foods, liquids, slurries, potato chips. PDS method prevents damage to cells and protein structures, enhances the flavour, texture and colour of the finished foods. PDS method saves 50% total drying costs, reduces storage and shipping costs. BV

FOOD PACKAGING

Aseptic packaging

- 2475 Ahvenainen (R). Quality assurance and quality control of aseptic packaging. *Food Reviews International* 4(1); 1988; 45-76

This review scrutinizes those quality assurance and control

methods that are at present in use or under development in order to assure the sterility of aseptically packaged products. 131 references. BV

Packaging materials

Plastics

- 2476 Dorairaj (V). Plastics in packaging. *Chemical Age of India* 39(3); 1988; 165-168

Briefly discusses packaging, modes such as rigid containers (containers for soft drinks, srikhand and yoghurt, vanaspati, edible oils, custard powder and drinking chocolate), flexible packs and fabric packs. Important Indian standards published by BIS in this area is also listed. BV

Polypropylene

- 2477 Chatterjea (BD). Outlook for polypropylene in India. *Chemical Age of India* 39(3); 1988; 159-164

Covers international trends, structure, properties and application; polypropylene in India is also discussed. New applications of polypropylene include dairy products such as yoghurt, sweets and fast foods. BV

FOOD ENGINEERING AND EQUIPMENT

Engineering

- 2478 Accorsi (CA), Carolini (G) and Zama (F). Effect of pressing aids on dehydration of cossettes with presses. *Industries Alimentaires et Agricoles* 104(7/8); 1987; 639-644 (Fr).
- 2479 Oziezak (JD). Microencapsulation and encapsulated ingredients. *Food Technology* 42(4); 1988; 136-151

This article discusses microencapsulation from four perspectives: (i) technical developments which formed the basis of modern technology; (ii) different types of microencapsulation techniques which are commercially evaluated by food industry; these include spray drying, air suspension coating, extrusion, spray cooling and spray chilling, centrifugal extrusion, rotational suspension separation, conservation, and inclusion complexing; (iii) criteria for encapsulation of ingredients and commercially available encapsulated ingredient types; (iv) suppliers of encapsulated ingredients and custom encapsulation services. GAR

- 2480 Pouillaude (F), Ternynck (P), Boy Marcotte (JL) and Roche (J). Pulp drying with superheated steam and mechanical recompression of steam. *Industries Alimentaires et Agricoles* 104(7/8); 1987; 647-655 (Fr).

ENERGY IN FOOD PROCESSING

N11

FOOD CHEMISTRY AND ANALYSIS

Chemistry

- 2481 Wong (JM) and Bernahard (RA). Effect of N source on pyrazine formation. *Journal of Agricultural and Food Chemistry* 36(1); 1988; 123-129

Chemistry(Analytical)

- 2482 Dikshit (SN), Udipi (SA), Rao (A) and Manohar (V). Separation of carotenoids and estimation of beta-carotene content of selected Indian food and food preparations by HPLC. *Journal of Food Science and Technology, India* 25(1); 1988; 39-41

The beta-carotene content of 15 vegetables and 9 cooked preparations were estimated by HPLC. The HPL chromatograms revealed the absence of Alpha-carotene in all 15 vegetables, presence of significant amounts of lycopene, and presence of beta-cryptoxanthin in carrots and tomatoes. The HPLC method was sensitive in estimating losses in beta-carotene due to cooking. Beta-carotene losses occurred in almost all cooked preparations and were greater when the vegetables were either cooked for a prolonged period or were highly macerated or were deep-fried in oil. AS

- 2483 McDermott (LP). Near infrared reflection analysis of processed foods. *Cereal Foods World* 33(6); 1988; 498-502

NIR analysis is a technique that has almost limitless potential for the laboratory and in-line analysis of food products. The varying applications discussed in this article demonstrates the versatility of the techniques as applied to grain and oilseed products, flour improvers, cocoa powder, ber fruit, meat products and spices. The calibration against primary or reference methods is essential. PHR

- 2484 West (SD) and Day (EWJr). Determination of fluridone residues in meat, milk, eggs, and crops by high-performance liquid chromatography or gas chromatography. *Journal of Agricultural and Food Chemistry* 36(1); 1988; 53-56

FOOD MICROBIOLOGY AND HYGIENE

- 2485 Iijima (S), Yamashita (S), Matsunaga (K), Miura (H), Morikawa (M), Shimizu (K), Matsubara (M) and Kobayashi (T). Use of a novel turbidimeter to monitor microbial growth and control glucose concentration.

Journal of Chemical Technology and Biotechnology 40(3); 1987; 203-213

- 2486 Venkatasubbaiah (P) and Dwarakanath (CT). Evaluation of a new medium for rapid enumeration of yeasts and molds in food. Journal of Food Science and Technology, India 25(1); 1988; 4-6

Long incubation periods (5 days) were involved in the conventional methods of enumeration of yeasts and molds at ambient temp. A rapid method has been developed which uses a mere nutrition medium consisting of malt extract or yeast extract, beef extract, dextrose, peptone and sodium chloride (pH 6.1) and incubation at 30 °C for 48 h. The bacterial growth was controlled by using chlorotetracycline and chloramphenicol (100 p.p.m.). Comparative studies carried out using two storage fungi (*Aspergillus* sp. and *Rhizopus* sp.) and three strains of yeasts (*Saccharomyces cerevisiae*, *Hansenula anomala* and *Torulopsis holmii*) with six different conventional media have indicated better recovery. The new modified method has also been found to help in reviving cultures that have been subjected to heat, chill freeze or osmotic stress. MVG

Enzymes

Amylases

- 2487 Groom (CA), Dauglis (AJ) and White (BN). Continuous Alpha-amylase production using *Bacillus amyloliquefaciens* absorbed on an ion exchange resin. Applied Microbiology and Biotechnology 28(1); 1988; 8-13

A method for the continuous production of extra cellular Alpha-amylase by surface immobilized cells of *Bacillus amyloliquefaciens* NRC 2147 has been developed. A large pore, macro reticular an ion exchange resin was employed. The reactor was operated continuously with a nutrient medium containing 15g/L soluble starch, as well as yeast extract and salts. The fermentor was operated for over 200 h and obtained a steady state enzyme concn. of 18700 amylase activity units per liter, and an enzyme volumetric productivity of 9700 amylase activity unit per litre/h. Parallel fermentations were performed using a 2 l stirred vessel fermentor. The immobilized cell reactor was observed to achieve larger volumetric productivities. MSP

Ethyl alcohol

- 2488 Chung (KM), Chung (DS) and Seib (PA). Ethanol production from grain mixed with brewers' condensed solubles (BCS). Brewers' Digest 63(3); 1988; 20-22

Brewers condensed solubles (BCS), a by product from brewery contain carbohydrates, proteins, spent yeast and spent hops. The use of BCS in cereal grain fermentation was explored. The meal from corn, sorghum or wheat was mixed BCS in the ratio of solids 9:1, 8:2 and 5:5, and the slurry 20% was hydrolysed using a bacterial Alpha-amylase (TAKA THERM) and the hydrolysate was fermented with yeast. The 1:1 mixture of grains with BCS produced slightly higher level of ethanol than that of cereals alone. The fermentation time was also reduced

by the use of BCS. NGM

- 489 Ligthelm (ME), Prior (BA) and de Preez (JC). The oxygen requirements of yeasts for the fermentation of D-xylose and D-glucose to ethanol. *Applied Microbiology and Biotechnology* 28(1); 1988; 63-68

The effect of oxygen availability on D-xylose and D-glucose metabolism by *Pichia stipitis*, *Candida shehatae* and *Pachytsoles tannophilus* was investigated. Oxygen was not required for fermentation of D-xylose or D-glucose, but stimulated the ethanol production rate from both sugars. Under oxygen-limited conditions, the highest ethanol yield coeff. (Y_{es}) of 0.47 was obtained on D-xylose with *P. stipitis*, while under similar conditions *C. shehatae* fermented D-xylose most rapidly with a specific productivity (Q_{pmax}) of 0.32 h⁻¹. Both of these yeasts fermented D-xylose better and produced less xylitol than *P. tannophilus*. Synthesis of polyols such as xylitol, arabitol, glycerol and ribitol reduced the ethanol yield in some instance and was related to the yeast strain, carbon source and oxygen availability. In general, these yeasts fermented D-glucose more rapidly than D-xylose. By contrast *Saccharomyces cerevisiae* fermented D-glucose at least three-fold faster under similar conditions. AS

- 2490 Parimoo (P) and Osumah (MA). Studies in raw material development-ethanol from palm saps. (Part I). *Chemical Age of India* 39(2); 1988; 97-98

Results of fractional distillation studies showed that ethanol (95.6 w/w) can be obtained to the extent of 2.5l from 10l of fermented palm saps (FPS). FPS is an economically viable raw material for the preparation of industrial ethyl alcohol. BV

Fermentation

- 2491 Holst (O), Hakanson (H), Miyabayashi (A) and Mattiasson (B). Monitoring of glucose in fermentation processes using a commercial glucose analyser. *Applied Microbiology and Biotechnology* 28(1); 1988; 32-36

A commercial glucose analyzer, originally designed for monitoring of blood glucose in patients, was tested for use in fermentation processes. The system operates in such a way that the measured value is updated every 90 sec. The measuring range of the system is 0-5 g glucose/l and the accuracy is plus or minus 7%. The response time was found to be approx. 6 min. The system was used to follow fermentations with two different microorganisms, *Saccharomyces cerevisiae* and *Escherichia coli* in media containing up to 5 g/l of glucose. The performance was fully satisfactory and the values had a very good correlation with off-line analyses. AS

Fermented foods

Tempeh

- 2492 Murata (K). Antioxidative stability of tempeh. *Journal of the American Oil Chemists' Society* 65(5); 1988; 799-800

Antioxidant activities of 6, 7, 4-trihydroxyisoflavone and the compound 0.58 substance, (Rf value 0.58 on Silica gel TLC with cyclohexane 9; ethylether 1) isolated from tempeh were measured by oxygen absorption. Both are active in preventing consumption of dissolved oxygen in an emulsified solutions of safflower oil. AS

Microorganisms

Bacteria

- 2493 Klausen (NK) and Huss (HH). A rapid method for detection of histamine-producing bacteria. *International Journal of Food Microbiology* 5(2); 1987; 137-146

A method for detecting histamine-producing bacteria is described. The method is based on automated conductance measurements in a histidine-containing medium (HDB) incubated at 25 °C, with a large and distinct increasing in the conductance being indicative of the presence of histamine-producing bacteria. An initial low pH (5.5) is optimal for measuring the histidine decarboxylating activity of *Morganella morganii*, but clear results are obtained at higher pH values (6.0-7.0) as well. It is shown that the histidine decarboxylating activity of *M. morganii* is unaffected by the presence of non-histamine producing bacteria. Using this new method in the examination of mackerel spoiled at high temp. The results obtained indicated the presence of large amounts of histamine-producing organisms. These were subsequently isolated and identified as belonging to the family Enterobacteriaceae. AS

- 2494 Patchett (RA), Kelley (AF) and Kroll (RG). Use of a microbial fuel cell for the rapid enumeration of bacteria. *Applied Microbiology and Biotechnology* 28(1); 1988; 26-31

The detection of bacteria using a thionine mediated microbial fuel cell was examined. On addition of bacteria to the anode compartment of fuel cell, a rapid increase in the current output was observed. Both the total change in the steady state current (ΔI) and the initial rate of change of current were proportional to the numbers of bacteria added. Regression analysis of plots of $\log_{10} \Delta I$ against $\log_{10}$ bacteria ml^{-1} (final concn.) upon the addition of *E. coli* K12, *Lactococcus lactis*, *Coliform* sp. A1, *Micrococcus* sp. M3 but not *Pseudomonas* sp. P5 gave reasonable correlation coeff. Detn. of the rates of respiration and thionine reduction by *E. coli* indicated that the transfer of metabolic electrons from the bacteria to the mediator was reasonably efficient (approx. 50%). These results are discussed with respect to the potential application of this technique for the rapid estimation of the bacterial contamination of foods. AS

Bacillus polymyxa

- 2495 Yang (RCA), Mackenzie (CR), Bilous (D), Seligy (VL) and Narang (SA). Molecular cloning and expression of xylanase gene from *Bacillus polymyxa* in *Escherichia coli*. *Applied and Environmental Microbiology* 54(4); 1988; 1023-1029

A 8.0 kilobase *Bacillus polymyxa* DNA insert in PBR 322 having xylanase coding sequence and capable of expression in *E. coli* was obtained after shotgun cloning. While the enzyme was excreted into the growth medium by *B. polymyxa* in *E. coli* xylanase remained associated with periplasm. Xylanase expression in *E. coli* by the cloned gene occurred in the absence of xylan and was reduced by glucose and xylose. The *rM* of xylanase produced by the cloned gene was estimated to be 48,000. RJ

Clostridium acetobutylicum

- 2496 Gutierrez (NA) and Maddox (IS). Role of chemotaxis in solvent production by *Clostridium acetobutylicum*. *Applied and Environmental Microbiology* 53(8); 1987; 1924-1927

Escherichia coli

- 2497 D'Mello (A) and Yotis (WW). The action of sodium deoxycholate on *Escherichia coli*. *Applied and Environmental Microbiology* 53(8); 1987; 1944-1946

Sodium deoxycholate is used in a number of bacteriological media for the isolation and classification of gram-negative bacteria from food and the environment. Initial experiments to study the effect of deoxycholate on the growth parameters of *Escherichia coli* showed an increase in the lag time constant and generation time and a decrease in the growth rate constant and total cell yields of this microorganisms. Cell fractionation studies indicated that sodium deoxycholate at levels used in bacteriological media interferes with the incorporation of (U- ¹⁴C) glucose into the cold-trichloroacetic acid-soluble, ethanol-soluble, and trypsin-soluble cellular fractions of *E. coli*. Finally, sodium deoxycholate interfered with the flagellation and motility of *Proteus mirabilis* and *E. coli*. It would appear then that further improvement of the deoxycholate medium may be in order. AS

Propionibacterium freudenreichii

- 2498 Crow (VL). Properties of alanine dehydrogenase and aspartase from *Propionibacterium freudenreichii* subsp. *Shermanii*. *Applied and Environmental Microbiology* 53(8); 1987; 1885-1892

The alanine dehydrogenase has been shown as the key enzyme involved in the metabolism of alanine. The properties of this enzyme and aspartase are investigated to understand why only aspartase and not alanine is metabolised during lactate fermentation. MVG

Pseudomonas fluorescens

- 2499 McKellar (RC) and Cholette (H). Effect of temperature shifts on extracellular proteinase-specific mRNA pools in *Pseudomonas fluorescens* B52. *Applied and Environmental Microbiology* 53(8); 1987; 1973-1976

The influence of shift in temp. from 20 to 32 C on extracellular proteinase synthesis by *Pseudomonas fluorescens* B52 was examined. When cells actively synthesizing proteinase at 20 C were shifted to 32 C, enzyme synthesis ceased immediately. After 30 min. at 32 C, cells recovered at 20 C after a lag of 30 min. Rifampin and chloramphenicol prevented recovery of synthesis at 20 C. Rifampin-insensitive proteinase synthesis (an indirect measure of proteinase-specific RNA pools) decreased after the exposure of cells to 32 C for 30 min but was recovered during incubation at 20 C. Controls not exposed to a temp. shift experienced no loss of rifampin-independent synthesis. Cells experienced a 50% reduction in RNA pools after 15 min at 32 C. The data support the working hypothesis that the loss of mRNA pools after treatment at 32 C is responsible for the lag before the recovery of extracellular proteinase synthesis. AS

Streptococcus faecalis

- 2500 Hosono (A), Yoshimura (A) and Otani (H). Antimutagenic activity of cellular component of *Streptococcus faecalis* IFO 12965. *Netherlands Milk and Dairy Journal* 41(3); 1987; 239-245

Thermomonospora fusca

- 2501 Gusek (TW), Wilson (DB) and Kinsell (JE). Influence of carbon source on production of a heat stable protease from *Thermomonospora fusca* YX. *Applied Microbiology and Biotechnology* 28(1); 1988; 80-84

Thermomonospora fusca YX produced a very active heat stable protease when incubated in media containing cellulose as the substrate. Cultures grown on Solka-floc generated the highest amount of protease whereas the protease was produced at significantly lower levels when *T. fusca* YX was grown on cellobiose or glucose. Negligible growth or protease production was observed when protein was used as a carbon source. The production of the protease did not appear to be constitutive. While rapid growth was observed on either cellobiose or glucose, protease levels were at least two to fourfold lower than for the *T. fusca* YX cultures grown on Solka-floc which generated 33% less cell mass. Protease production was four times lower in cultures which employed casein hydrolysate (tryptone) or xylan as carbon sources than for cellulose. AS

Fungi

Aspergillus flavus

- 2502 Peleg (Y), Rahamim (E), Kessel (M) and Goldberg (I). Malic acid accumulation by *Aspergillus flavus*. II. Crystals and hair-like processes formed by *Aspergillus flavus* in L-malic acid production medium. *Applied Microbiology and Biotechnology* 28(1); 1988; 76-79

Mushrooms

- 2503 Ballarini (G). Dried mushrooms classification by U.V. *Industrie Alimentari* 254(26); 1987; 1017-1019 (It).
- 2504 Kim (JH), Stegeman (H) and Farkas (J). Preliminary studies on radiation resistance of thermophilic anaerobic spores and the effect of gamma radiation on their heat resistance. *International Journal of Food Microbiology* 5(2); 1987; 129-136

D values of gamma-irradiated spores of *Clostridium thermosaccharolyticum* ATCC 7956 and *Desulfotomaculum nigrificans* ATCC 7646 in spent mushroom-compost infusion were 2.54 kGy and 2.20 kGy resp. i.e. in the same range as the radiation D values of various mesophilic bacterial spores of much lower heat resistance than that of the thermophilic spores investigated. The combination of gamma irradiation with a subsequent heat treatment had a synergistic sporicidal effect which increased with increasing radiation doses. The heat sensitization of bacterial spores by irradiation seems to be decreasing with decreasing inherent heat resistance of various spore-formers. Heat sensitization of *D. nigrificans* spores by 2.5 kGy dose of gamma radiation could also be demonstrated when they were inoculated into cultivated mushrooms (*Agaricus bisporus*). It was, therefore, concluded that radiation doses which inhibit after ripening and senescence of harvested fresh mushrooms may also improve other specific conditions the efficacy of the heat preservation of canned mushrooms. AS

- 2505 Manu-Tawiah (W) and Martin (AM). Chemical composition of *Pleurotus ostreatus* mycelial biomass. *Food Microbiology* 4(4); 1987; 303-310

The *Pleurotus ostreatus* mycelium grown in the peat extract-based medium was characterized by a high protein content, a favourable amino acid composition and high concn. of essential fatty acid and minerals that permit its consideration as a potential food. BV

Yeasts

- 2506 Jimenez (J) and Benitez (T). Selection of ethanol-tolerant yeast hybrids in pH-regulated continuous culture. *Applied and Environmental Microbiology* 54(4); 1988; 917-922

Hybrids between naturally occurring wine yeast and laboratory strains were formed as a method of increasing the genetic variability

to improve the ethanol tolerance of yeast strains. The hybrids were subjected to competition experiments under continuous culture controlled by pH with increasing ethanol concn. over a wide range to select the fastest growing strain at any concn. of ethanol. RJ

- 2507 Peleg (Y), Stieglitz (B) and Goldberg (I). Malic acid accumulation by *Aspergillus flavus*. 1. Biochemical aspects of acid biosynthesis. *Applied Microbiology and Biotechnology* 28(1); 1988; 69-75

The accumulation and excretion of L-malic acid, and to a lesser extent succinic and fumaric acids, by *Aspergillus flavus* occurs under aerobic conditions in a medium containing a high glucose concn. a limiting amount of N and neutralizing agent calcium carbonate. An overall malic, succinic, and fumaric acid molar yield of up to 68.6% (mole. of acid produced per mole. of glucose utilized) is obtained after incubation for 6 to 8 days, although a transient molar yield of 76% was measured. Glucose consumption and formation of acids were faster in a fermentor than in shake flasks. During the acid production stage, the activity of malate dehydrogenase increased 6 to 10-fold while that of fumarase changed only slightly. Cycloheximide greatly inhibited both L-malic acid production and the increase in malate dehydrogenase activity, without affecting fumarase activity. The results suggested that de novo protein synthesis is involved in the increase of malate dehydrogenase and that this enzyme is essential for L-malic acid production and accumulation. AS

Rhodotorula graminis

- 2508 Orndorff (SA), Costantino (N), Stewart (D) and Durham (DR). Strain improvement of *Rhodotorula graminis* for production of a novel L-phenylalanine ammonia lyase. *Applied and Environmental Microbiology* 54(4); 1988; 996-1002

Rhodotorula graminis GX 5007 was mutagenised with ethyl methane-sulphonate and selected for resistance to phenyl propionic acid (an analog of t-cinnamic acid). One of the mutants R. *graminis* GX 6000 produced inducible phenylalanine ammonia lyase at levels four to five fold higher than the wild type strain. Further more the enzyme was more stable and had higher specific activity. Some differences in the regulation of enzyme biosynthesis between the mutant and wild type strains were also noticed. RJ

Saccharomyces cerevisiae

- 2509 Honda (H), Iijima (S) and Kobayashi (T). Cloning and expression in *Saccharomyces cerevisiae* of an endo-Beta-glucanase gene from a thermophilic cellulolytic anaerobe. *Applied Microbiology and Biotechnology* 28(1); 1988; 57-58

The gene encoding heat-stable Beta-glucanase from a thermophilic cellulolytic anaerobe was recloned in *Saccharomyces cerevisiae*. Yeast transformant expressed the heat-stable endo-Beta-glucanase and produced a level of enzyme activity similar to the *Escherichia coli* transformant. AS

- 2510 Lee (FJS) and Hassan (HM). Effect of oxygen tension on stability and expression of a killer toxin chimeric plasmid in a chemostat culture of *Saccharomyces cerevisiae*. *Applied Microbiology and Biotechnology* 27(1); 1987; 72-74

The effects of oxygen tension and dilution rate on expression and stability of killer toxin chimeric plasmid (PADH-10A) in transformants of wine yeast (Montrachet 522) were investigated using a glucose-limited chemostat culture. Killer toxin activity increased as a function of dilution rate when transformants were grown in N or air, but not in 100% (oxygen killer transformants grown in the presence of nitrogen had 2-4 fold and 10-15 fold higher toxin expression than that in presence of air and 100% oxygen resp. Plasmid stability increased as a function of dilution rate, regardless of the oxygen tension used. However, transformants grown in air gave the highest plasmid stability. AS

- 2511 Salgueiro (SP), Sa-Correia (I) and Novais (JM). Ethanol-induced leakage in *Saccharomyces cerevisiae*. Kinetics and relationship to yeast ethanol tolerance and alcohol fermentation productivity. *Applied and Environmental Microbiology* 54(4); 1988; 903-909

Ethanol stimulated the leakage of amino acids and 260 nm -light-absorbing compounds from cells of *Saccharomyces cerevisiae*. Under isothermic conditions (30 C) and upto 22% (vol/vol) ethanol the resistance to ethanol induced leakage of 260 nm light-absorbing compounds was closely related with the ethanol tolerance of three strains of *Kluyveromyces marxianus*, *Sacch. cerevisiae* and *Sacch. bayanus*. RJ

Hygiene

- 2512 Litopoulou-Tzanetaki (E). Interactions of *Pediococcus pentosaceus* and some food-borne pathogens. *Food Microbiology* 4(4); 1987; 293-302

The interactions between *Pediococcus pentosaceus* strain 41-14 and some food-borne pathogens during associative growth for 24 h was studied. *P. pentosaceus* was stimulated by up to 91.6% by *Escherichia coli* NCTC 9702 and by up to 84.7% by *Salmonella typhimurium* var. Copenhagen at the end of the incubation period. Stimulation by *Staphylococcus aureus* NCTC 6571 was much lower. *S. aureus* was the only food-borne pathogen to be inhibited by *P. pentosaceus* and at the end of the incubation period a 44.6% inhibition was noted. Filtrates of skim milks cultured with sixteen different strains of *P. pentosaceus* and adjusted to pH values 4.5, 4.8 and 5.1 were evaluated for their ability to inhibit growth of food-borne pathogens. Only 5 strains gave distinctive zones of inhibition. *E. coli* strain NCTC 9702 was not inhibited in any case. *S. aureus* NCTC 6571 was inhibited by 3 strains, *S. typhimurium* var. Copenhagen by 2 strains and *Yersinia enterocolitica* 0:9/4360 by 1 strain. In general the pH of the filtrate affected the incidence and extent of inhibition. AS

- 2513 Verhoefen (U). Putting the breaks on bacteria in the food industry. *Indian Food Industry* 7(2); 1988; 12-14

Nowadays sterile atm. (air) is indispensable in the food industry there by purity standards are becoming more stringent in line with requirements for better keeping qualities and storage stability of finished products like perishable foodstuffs. The author examines some of the bacterial contamination that exists and describes how standards are being raised by the latest high-performance sterile filter systems. GP

BIOTECHNOLOGY

- 2514 Brunerie (P), Benda (I), Bock (G) and Schreir (P). Bioconversion of citronellol by *Botrytis cinerea*. *Applied Microbiology and Biotechnology* 27(1); 1988; 6-10
- 2515 Chilton (Mary-Dell). Plant genetic Engineering. Progress and promise. *Journal of Agricultural and Food Chemistry* 36(1); 1988; 3-5
- 2516 Moresi (M), Clementi (F), Rossi (J), Medici (R) and Vinti (GL). Production of biomass from untreated orange peel by *Fusarium avenaceum*. *Applied Microbiology and Biotechnology* 27(1); 1987; 37-45
- 2517 Shackleton (R). The application of ceramic membranes to the biological industries. *Journal of Chemical Technology and Biotechnology* 37(1); 1987; 67-69

The construction, design and configurations of ceramic membranes are described together with their properties, advantages and disadvantages. Some applications in the beverage and biotechnology industries are described together with plant layouts and results obtained. AS

- 2518 Weibel (EK). The biofreezer, a new contained freezing equipment in biotechnology. *Applied Microbiology and Biotechnology* 27(1); 1987; 46-49

The Biofreezer has been designed for freezing biomass or cell-suspensions in the laboratory, pilot and large scale biotechnology under hygienic and biosafe conditions. The principle is based on the freezing of biomass drops on the surface of a liquid N bath to form small beads, which are harvested automatically. The application is presented as a part of the Roferon-A production (leukocyte interferon Alpha-2a Roche), representing a physically contained system extending from 1000 fermenter through continuous centrifugation to the frozen biomass beads. The freezing process in the Biofreezer is extremely fast and complete and the beads can be thawed instantaneously. Comparisons with other freezing systems are described. AS

TISSUE CULTURE

- 2519 Reynolds (JF). Chemical regulation in tissue culture. An overview. *HortScience* 22(6); 1987; 1192-1194

FOOD ADDITIVES

Dyes

Tartrazine

- 2520 Maekawa (A), Matsuoka (C), Onadera (H), Tanigawa (H), Furuta (K), Kanno (J), Jang (JJ), Hayashi (Y) and Ogiu (T). Lack of carcinogenicity of tartrazine (FD & C Yellow No. 5) in the F344 rat. *Food and Chemical Toxicology* 25(12); 1987; 891-896

Tartrazine was dissolved in distilled water at levels of 0, 1 or 2% and groups of about 50 male and 50 female rats were fed one of these solution adlib as their drinking water for upto 2 yr. No toxic lesions specifically caused by tartrazine were detected in any treated group of either sex except for tumours which were histologically of spontaneous tumours that are known to occur in this strain of rats. No significant increases of the incidence of any tumours for mesothelioma in males and stromal polyps in females were detected. MVG

Flavour

- 2521 Mosandl (A). Chirality in flavour chemistry-Recent development in synthesis and analysis. *Food Reviews International* 4(1); 1988; 1-43

The state of the art in research on chirality and odour is presented, with special emphasis on synthetic and analytical methods. The synthesis of 1-octen-3-ol enantiomers, of chiral alkan-2-yl esters, of "whisky lactone" and of chiral sulphur compounds, known as characteristic components of the yellow passion fruit, are reviewed. It is demonstrated that optically pure stereoisomers exhibit their own, specific sensory characteristics. Therefore, stereoisomers of very high enantiomeric excess (ee) must be achieved for valid evaluations of their structure-function relationships. Analytical methods for stereodifferentiation of chiral flavour compounds and recent development in biotechnology are discussed. 76 references. AS

Encapsulated flavour

- 2522 Mutka (JR) and Nelson (DB). Preparation of encapsulated flavours with high flavour level. *Food Technology* 42(4); 1988; 154-157

Modified procedures now allow preparation of encapsulated flavours with flavour levels over twice that of prior commercial products. Flavour fix of the products increases when encapsulated by means of extrusion process. GAR

Preservatives

Antimicrobials

- 2523 Collins (MA) and Charles (HP). Antimicrobial activity of carnosol and ursolic acid. Two anti-oxidant constituents of *Rosmarinus officinalis*. *Food Microbiology* 4(4); 1987; 311-315

Carnosol and ursolic acid extracted from rosemary, exhibited inhibitory effects. Carnosol at $15 \mu\text{g ml}^{-1}$ inhibited all the test microbes to the greatest extent. Ursolic acid was not superior to BHA but was more effective overall than BHT. Carnosol caused a significant decrease in both bacterial and yeast growth even at $50 \mu\text{g ml}^{-1}$. Thus carnosol might prove useful as a food antioxidant which could also contribute to the retardation of the microbial spoilage of foods. BV

Sweeteners

Aspartame

- 2524 Chin-Pin Yang) and Chein-Shyoung Su). Synthesis of aspartame precursor. Alpha-L-Aspartyl-L-phenylalanine methyl ester in ethyl acetate using thermolysin entrapped in polyurathane. *Biotechnology and Bioengineering* 32(5); 1988; 595-603

Precursor for aspartame an important sweetener, can be prepared by employing immobilized thermolysin coupled to ion exchange resin and glutaraldehyde to obtain Alpha-L-aspartyl L-phenylalanine methyl ester. The process described here employs thermolysin entrapped into an hydrophobic cross-linked polyurethane to condense Alpha-L-aspartic acid with phenylalanine methyl ester to Alpha-L-aspartyl-L-phenylalanine methyl ester. The conversion efficiency has 94% for 30 h of reaction at 40 °C when 46 mg of enzyme was entrapped. GAR

CEREALS

- 2525 Bruggemann (J) and Ocker (H-D). On the types of heavy metal binding in cereal and cereal products. *Getreide, Mehl und Brot* 42(4); 1988; 108-112 (De).
- 2526 Elling (H). Rapid flour quality tests. *Cereal Foods World* 33(6); 1988; 495-497

A rapid test for assuring the quality of flour was developed. The test consists of measuring the consistency, Brookfield viscosity and griddle drying time of a flour water batter, the combined results of which have proved useful in determining flour strength and functionality for use in baking mixture. The quality scores as assured by the above methods have been found to be significantly related to protein content, farinograph characteristics and McMichael viscosity.

PHR

- 2527 Macgregor (AW), Marchylo (BA) and Kruger (JE). Multiple Alpha-amylase components in germinated cereal grains determined by isoelectric focusing and chromatofocusing. *Cereal Chemistry* 65(4); 1988; 326-333

Isoelectric focusing showed that germinated barley (two- and six-rowed), wheat (hard red spring and amber durum), rye, and triticale contained multiple forms of Alpha-amylase that could be divided into low (less than or equal to pI 5.5) and high-pI (less than or equal to pI 5.8) groups. Only low-pI Alpha-amylase components were found in germinated oats, corn, millet, sorghum, and rice. Quantitative data on the proportions of high- and low-pI groups in barley, wheat, rye, and triticale were obtained by chromatofocusing. Barley contained the highest proportion (97.9%) of high-pI Alpha-amylase and amber durum wheat the lowest (79.1%). In addition, chromatofocusing showed that germinated corn contained a group of Alpha-amylase components having pI value between those of the high and low-pI groups. A comparison of the accurately measured Alpha-amylase values from chromatofocusing with Alpha-amylase component profiles obtained by isoelectric focusing revealed that detn. of the relative proportions of Alpha-amylase components on isoelectric focusing gels by visual inspection could be misleading. There was an immunochemical relationship among the low-pI-Alpha-amylase components of barley, wheat, rye, triticale, the major Alpha-amylase components of millet, sorghum, and possibly oats, and a minor component in corn. AS

- 2528 Sauer (DB). Mold invasion in relation to grain damage. *Cereal Foods World* 33(6); 1988; 489-490

This review article discusses about the kind of damage caused by molds or fungi to grains, factors that cause fungi to develop in grain and to damage it and the method of determining the damage in the grain. PHR

- 2529 Tuominen (JP), Pyysalo (HS) and Sauri (M). Cereal products as a source of polycyclic aromatic hydrocarbons. *Journal of Agricultural and Food Chemistry* 36(1); 1988; 118-120

Gas chromatography-mass spectrometry was used for the detn. of 25 polycyclic aromatic hydrocarbons (PAH) in cereal products available in Finland. Even though the levels of PAH in ordinary cereal products were low, the high level of consumption of these products (67.7 kg/person annually) makes them a significant source of PAH. The level of PAH in bolted flours and milled oats and wheat ranged from 25 to 38 μ /kg. The av. concn. of PAH in bran was 220 μ /kg. One speciality smoked cereal product contained PAH in concn. as high as 4500 μ /kg and benzo[Al]pyrene in concn. 100 times higher than in other cereal products. The av. annual intake of the 25 PAH compounds from ordinary cereal products was estimated to be 2000 μ g per capita. AS

- 2530 Weipert (D) and Gerstenkorn (P). Evaluation of gluten properties by the use of creep - recovery measurements. *Getreide, Mehl und Brot* 42(4); 1988; 99-103 (De).

A new equipment Glutograph has been tested with respect to its use for the expression of gluten quality and its reproducibility. The washing out procedure and preparation of gluten and the measurement conditions have to be standardized as the gluten exhibits a strong shear and time dependence characteristics of a viscoelastic materials. The shearing time above as a characteristic of the creep-recovery does not describe gluten qualities fully. A better conformity with the baking behaviour could be obtained by taking into consideration the nature and quantity of gluten. It is also possible to carry out the measurement with dough itself, in which case further tests need to be done to optimize the measurement parameters. SZA

Oats

Oat proteins

Globulins

- 2531 Ching-Yung Ma Harwalkar (VR). Study of thermal denaturation of oat globulin by ultraviolet and fluorescence spectrophotometry. *Journal of Agricultural and Food Chemistry* 36(1); 1988; 155-160

Dilute (< 0.05%) oat globulin solution at high ionic strength was studied for thermal denaturation by ultraviolet (UV) and fluorescence spectrophotometry. There was significant red shift of absorption max. in the UV spectra when the protein was heated at 110 C. Exposure of tryptophan and tyrosin residues in the heated sample was shown by second-derivative and difference derivative spectra. Protein unfolding was indicated by fluorescence emission spectra which showed a significant blue shift. When 1% oat globulin was heat aggregated and fractionated into soluble and insoluble fractions, UV and fluorescence spectra indicated no marked protein unfolding but showed extensive denaturation in the insoluble aggregates. The soluble fraction had significant higher surface hydrophobicity than the insoluble fraction and the unheated protein. MVG

Rice

- 2532 Dublish (RK), Chauhan (GS) and Bains (GS). Nutritional quality of extruded rice, ragi and defatted soy flour blends. *Journal of Food Science and Technology, India* 25(1); 1988; 35-38

Nutritional quality of rice, ragi and defatted soy flour blends as affected by extrusion cooking was evaluated. The blends were processed in the Wenger X-5 extruder using a feed rate of 27.2 kg/h, water flow of 6.8 kg/h, screw speed of 300 rpm, extruder exist temp. (EET) of 65 and 95 plus or minus 2 C through a diet of 1/8 inch. The extrusion cooking resulted in the inactivation of trypsin inhibitor activity and at 65 and 95 plus or minus 2 C the inactivation was 42.6-71.4 and 72.3-100% resp. The losses in available lysine content ranged from 3.6-12.8% in various blends depending on the temp. of extruder barrel. The proportion of phosphorus as phytic P decreased (11.1-29.1%) during extrusion cooking. A discernible loss in tannin

like compounds was observed in extruded blends. The PERs of processed rice-defatted soy flour (85:15), rice-ragi-defatted soy flour (42.5:42.5:15) and ragi-defatted soy flour (85:15) blends were 2.61, 2.41 and 2.23 resp. as compared to 2.21, 1.92 and 1.81 of their unprocessed counterparts. AS

- 2533 Duran (N), Reyes (JL), Baeza (J) and Campos (V). Biomass photochemistry. XII. Chemical and phytochemical pretreatment of rice hull and its fungal degradation. *Biotechnology and Bioengineering* 32(4); 1988; 564-568

Residual cellulosic materials of cereal starch and hulls contain large amount of cellulose and hemicellulose which can be energy source for animal feeding. In these material the native celluloses are resistant to microbial and fungal degradation. The study deals with pretreatment to change micelle structure cellulase and remove lignin to enhance availability of native cellulose materials. The data reported here also indicate that *Chrysonilia sitophila* can be used as a biosynthetic agent to produce high-quality protein from rice hull. GAR

- 2534 He (G-C) and Suzuki (H). A method to remove the outer layer of rice endosperm without damaging starch granules. *Cereal Chemistry* 65(4); 1988; 307-312

A new milling method was contrived to prepare intact starch granules from the outer layer of rice grains. The grains were first soaked in 0-100% ethanol and then wet milled. As the ethanol concn. increased the solvent content of soaked grains decreased, and the hardness of the grains increase, both showed an inflection point at an ethanol concn. of 60%. It was proved satisfactory to soak and mill rice grains in 60-70% ethanol, based on the milling degree, milling breakage, and the properties of the starch granules prepared. This method is useful as a laboratory technique. AS

- 2535 Pan (S-J) and Reeck (GR). Isolation and characterization of rice Alpha-globulin. *Cereal Chemistry* 65(4); 1988; 316-319

A new, mild isolation scheme for rice Alpha-globulin is reported. The Alpha globulin is separated from low mol. wt. components of the globulin fraction by chromatography on hydroxyapatite. A major difference between this approach and a previous purification procedure for the protein is that in this method the protein is not exposed to low pH. This method of purification should allow conformational studies to be conducted on rice Alpha-globulin. An initial physicochemical characterization of the purified protein is reported. AS

- 2536 Rombach (MC), Rombach (GM) and Roberts (DW). Pathogens of insect pests of rice. A bibliography. *Insect Science and its Application* 8(2); 1988; 197-210

275 references. BV

Brown rice

- 2537 Taira (H), Nakagahra (M) and Nagamine (T). Fatty acid composition of Indica, Sinica, Javanica, and Japonica groups of non-glutinous brown rice. *Journal of Agricultural and Food Chemistry* 36(1); 1988; 45-47

The fatty acid composition of Indica, Sinica, Javanica and Japonica groups of non-glutinous brown rice was investigated on 15 cv each. Significant differences between groups were shown in all fatty acids except myristic acid. Regarding the predominant fatty acids, there were significant differences among the four groups in palmitic acid, among the four groups except between Indica and Sinica in linoleic acid, and among Japonica and other groups in oleic acid. As for the relationship between fatty acid contents, the highest and negative correlation between oleic and linoleic acid contents was shown in each of four groups. The regression line in the scatter diagram between both the fatty acids divided into three lines, i.e. Indica and Sinica, Havanica, and Japonica group lines. AS

Rye

- 2538 Fengler (AI) and Marquardt (RR). Water-soluble pentosans from rye. I. Isolation, purification and characterization. *Cereal Chemistry* 65(4); 1988; 291-297

The objectives of the study were to isolate, identify, and partially characterize the highly viscous factor in rye. This factor, which was previously implicated by its effects on the nutritional value of rye, was shown to be located in the endosperm of the seed and was relatively stable when extracted at a neutral pH from heat-treated flour. The active component was a water-soluble, highly viscous, pentosan-rich compound. The purified fraction contained 79% pentoses with a xylose-to-arabinose ratio of 62 to 38. The isolate also had traces of minerals and protein (N X 5.7) and 10% glucose-containing carbohydrates. The content of water-soluble pentosans and the viscosity factor were much greater in rye flour (endosperm) than that found in wheat or triticale flour. AS

- 2539 Fengler (AI) and Marquardt (RR). Water-soluble pentosans from rye. II. Effects on rate of dialysis and on the retention of nutrients by the chick. *Cereal Chemistry* 65(4); 1988; 298-302

The properties of water-soluble, pentosan-rich fraction that was isolated from rye flour were tested in vitro using a dialysis system and in vivo with chicks. The in vitro studies demonstrated that both an extract of rye and the pentosan-rich fraction impeded the rate of dialysis of three different salts and glucose, as well as glucose that was being enzymatically hydrolyzed from starch. When either the rye extract or the pentosan solution was digested prior to dialysis with a crude extract of *Trichoderma viride*, the viscosity was completely reduced in both fractions to that of water and the effect on the rate of dialysis of sodium chloride was eliminated. Pancreatin, in contrast, had no effect on these extracts. Nutritional studies with young chicks demonstrated that nearly all of the antinutritive activ-

ity of rye, as assessed by fat retention, was associated with the pentosan-rich isolate. The results suggest that the principle antinutritive factor in rye grain is a highly viscous, water-soluble, pentosan-rich carbohydrate. AS

Wheat

- 2540 Dreese (PC), Faubion (JM) and Hosney (RC). Dynamic rheological properties of flour, gluten, and gluten starch doughs. I. Temperature-dependent changes during heating. *Cereal Chemistry* 65(4); 1988; 348-353

The dynamic rheological properties of flour-water doughs and doughs made from blends of commercial gluten and commercial starch were tested using a dynamic rheometer. Ambient temp. frequency scans of previously heated and cooled flour-water doughs showed that irreversible rheological changes were caused by heating doughs to greater than or equal to 55 C. Dynamic rheological measurements of flour-water doughs during heating (temp. scans) indicated that G' (the storage modulus) increased and the tangent (ratio of G''/G' where G'' is the loss modulus) decreased rapidly between 55 and 75 C. The magnitude of the temp. dependent rheological change (G'') was proportional to the doughs starch content. Adding pregelatinized starch to a gluten-starch blend resulted in an increase in G' and a decrease in tangent, similar to the change caused by heating. Heating a gluten-water dough to 90 C and then cooling to 30 C caused only a small change in the dynamic rheological properties. This change appears to be caused by gelatinization of the gluten's residual starch. However, heating a gluten-water dough to 80 C increased the gluten's mixing time by more than 1,000%. AS

- 2541 Dreese (PC), Foubion (JM) and Hosney (RC). Dynamic rheological properties of flour, gluten and gluten-starch doughs. II. Effect of various processing and ingredients changes. *Cereal Chemistry* 65(4); 1988; 354-359

The dynamic rheological properties of gluten-starch, gluten, and flour doughs were tested at 25 C and 2% strain, over a frequency range of 0.01 to 50 Hz. Cysteine and mercaptoethanol reduced the storage modulus (G') increased the loss tangent (G''/G' where G'' is the loss modulus). When flour was fractionated into gluten, starch, and water-soluble fractions, the presence of the water-soluble fraction affected G'' and loss tangent in a manner similar to cysteine or mercaptoethanol. The fast-acting oxidant, potassium iodate, increased G' but had no effect on the tangent. Increased dough moisture resulted in lower values of G' at all frequencies tested. Over the range used, the moisture of gluten-water doughs did not affect the tangent at any frequency tested. The moisture content of flour-water doughs did not affect the tangent at frequencies of 120 Hz and below, but at 20 and 50 Hz the results were erratic. Overmixing flour-water doughs had essentially the same rheological effect as increasing dough moisture. AS

- 2542 He (H) and Ponte (JGJr). Evaluation of Chinese and U.S. wheat and their blends for bread making. *Cereal Foods World* 33(6); 1988; 506-510

The difference between Chinese and U.S. wheats in terms of milling, wheat and flour properties, and bread quality were compared. A group of six wheats from three provinces of China (Jiangsu, Henan, and Heilongjiang) were found to exhibit widely varying properties in chemical analysis and milling quality. Flours milled from these wheats also varied in chemical analysis and milling quality. Flours milled from these wheats also varied in chemical analysis, dough rheological properties, and breadmaking quality. The U.S. hard red winter (HRW) wheat, which was composite from seven Kansas locations, was of good quality except for small wheat kernel size, and produced a strong flour. Most of the Chinese wheat flours yielded bread that was generally unsatisfactory when compared to bread made from the U.S. HRW flour. To produce acceptable white pan bread, the Chinese wheats, except for Longfu wheat from Heilongjiang province, had to be blended with 75% HRW wheat. AS

- 2543 Mattern (PJ). Wheat hardness. A microscopic classification of individual grains. *Cereal Chemistry* 65(4); 1988; 312-315

Wheat grains placed lengthwise, crease up, on a self-adhesive tape were crushed with corrugated rollers spaced at 1.08 mm. Crushed grains were viewed with a dissecting microscope at a magnification of 15X. A hardness index was established using a rating from 1 to 10 (soft to hard). A set of standardizing photographs and a video tape were prepared as a training aid for the method. The microscopic hardness evaluation of single grains provides an inexpensive, accurate evaluation of wheat samples to determine heterogeneity environmental influence on hardness, and the percentage mixture of soft and hard wheats. Microscopic data gave coeff. of correlation of -0.94 and -0.95 with particle size index and near-infrared reflectance, resp. AS

- 2544 Nierle (W) and El Baya (AW). The effect of lipid complexes on the baking behaviour of wheat. *FAT Science and Technology* 89(12); 1987; 486-491 (De).

- 2545 Singh (N) and Sekhon (KS). Mold damage. Its effect on physico-chemical and functional properties of wheat. *Indian Food Industry* 7(2); 1988; 9-11

Storage of wheat under unfavourable conditions enhance molds infestation which adversely affects the physico-chemical and functional properties of breadmaking wheat flours. The infestation can be assessed either from green fluorescent substance accumulated in grains or from quantitative estimation of the glucosamine with fungal chitin. GP

Wheat bran

- 2546 Beltran Llerandi (G), Abreu (M), Garcia Roche (MO), Symington (R), Castillo (A), Gonazalez (L) and Memendez (R). The effect of wheat bran on the excretion of cadmium in rats. *Nahrung* 31(10); 1987; 987-991

The influence of wheat bran as source of dietary fibre on the excretion of ingested Cd from diet was studied. No evidence is provided that an increasing portion of wheat bran in the diets induced an increase in Cd excretion. BV

Wheat proteins

- 2547 Chakraborty (K) and Khan (K). Biochemical and breadmaking properties of wheat protein components. I. Compositional differences revealed through quantitation and polyacrylamide gel electrophoresis of protein fractions from various isolation procedures. *Cereal Chemistry* 65(4); 1988; 333-340

Three hard red spring wheat var. grown under similar environmental conditions, were fractionated by three protein solubility procedures and compared for quantitative protein recovery, subunit composition, and mol. wt. and size distribution. Variations in the isolation conditions and types of solvent used had a major effect on the amount of protein extracted in each fraction. Polyacrylamide gel electrophoresis of the various proteins fractions isolated by the different solubility procedures showed distinct difference in subunit composition for the same class of protein. Contamination of gliadin with glutenin was found in two of the three isolation procedures. The acetic acid soluble, acetic acid insoluble, and lactic acid soluble fractions from the different procedures, although referred to as glutenin, were different in composition. Some residue fractions (though containing starch) contained substantial amounts of protein. AS

- 2548 Chakraborty (K) and Khan (K). Biochemical and breadmaking properties of wheat protein components. II Reconstitution baking studies of protein fractions from various isolation procedures. *Cereal Chemistry* 65(4); 1988; 340-344

Two hard red spring wheat var., Prodax and Len, of poor and good breadmaking quality, resp, were fractionated into various solubility fractions by three different procedures. Reconstitution baking studies were carried out to interchange fractions between var. and between fractionation procedures to evaluate the breadmaking properties of the various fractions. Exchanging the water-soluble and starch fractions, separately, between the two var. showed different effects on loaf vol. depending on the fractionation procedure for isolating these fractions. Exchanging the gliadin and glutenin fractions, however, showed that the fractions that contained larger amounts of glutenin proteins gave the highest positive responses to loaf vol. and were independent of the fraction procedure. However, the magnitude of loaf vol. response of the glutenin fraction was dependent on the fractionation procedure. Comparison of fractionation procedures showed that 70% (v/v) aqueous ethanol used to extract the gliadin fraction impaired the visco-elasticity of reconstituted doughs from both var. Starch fractions, however, did not seem to be affected by the fractionation procedures. Addition of various levels of total lipids to reconstituted fractions (obtained from defatted flour) showed differences in loaf volume response. AS

Gliadins

- 2549 Huebner (FR) and Bietz (JA). Quantitative variation among gliadins of wheat grown in different environments. *Cereal Chemistry* 65(4); 1988; 362-366

Reversed phase high performance liquid chromatography (RP-HPLC) studies were conducted to find out quantitative differences among gliadins from three different wheat var. grown with variable levels of sulphur fertilizer and two at different locations. No qualitative differences were observed among the gliadins. Major quantitative variations existed, particularly for early-eluting, sulphur poor co-gliadins and for gliadins from wheats from different locations. This was attributed to the changes in the environmental factors and the genetic differences. Further variations may influence the varietal identification procedures based on gliadin analysis. AR

- 2550 Iwami (K), Hattori (M), Yasumi (T) and Ibuki (F). Stability of gliadin-encapsulated unsaturated fatty acids against autoxidation. *Journal of Agricultural and Food Chemistry* 36(1); 1988; 160-164

The antioxidant effects at various water activity of spray-dried powders prepared from alcoholic solutions of gliadin, linoleic acid, and palmitic acid were compared against powders prepared by simple mixing of these components in the same proteins and against gelatin or starch powders substituted for gliadin. The effectiveness of gliadin at low or moderate water activity in the simple mixture that was not as good as at high water activity was greatly improved via the process of spray-drying. This process caused a significant loss in the extraction efficiency of fatty acids by hexane but did not influence the *in vitro* digestion of gliadin. The outer surface of the spray-dried gliadin particles containing the lipid was characterized by the disappearance of deep dents otherwise observed by SEM. These findings imply that the lipid droplets must have been embedded in the gliadin matrix so as to avoid oxygen attack. AS

Glutenin

- 2551 Prasada Rao (UJS) and Nigam (SN). Chromatography of glutenin on sepharose CL-4B in dissociating solvents. Molecular weight composition of covalently bonded glutenin. *Cereal Chemistry* 65(4); 1988; 373-374

Two glutenin fractions isolated by successive gel filtration from glutenin on Sephadex G-200 using the solvent systems acid-guanidine hydrochloride-cetyl trimethylammonium bromide (AGC) and sodium dodecyl sulphate (SDS) were studied for their S_{20w} values and mol. wt. composition of the covalently bonded glutenin on Sepharose CL-4B. AR

Wheat starch

- 2552 Seguchi (M) and Yamada (Y). Hydrophobic character of heat-treated wheat starch. *Cereal Chemistry* 65(4); 1988; 375-376

The prime starch extracted from wheat flour was heated for 1, 2, or 5 h. at 120 °C. The heat treated samples were shaken in water with isoamyl alcohol, and the stability of air bubbles was evaluated. The air bubble stability increased with heat treatment upto 2 h. and there after remained the same, indicating max. hydrophobicity level after 2h. The hydrophobic starch granules are implicated in the stability of cake batter and improvement in cake structure and texture. AR

- 2553 Walker (CE), Ross (AS), Wringly (CW) and McMathr (GJ). Accelerated starch-paste characterization with the rapid visco-analyzer. *Cereal Foods World* 33(6); 1988; 491-492

Rapid visco-analyzer developed for the Australian wheat industry as a quick trust for sprout damage in wheat produced pasting curves similar to Brabender visco amylograph, but requires 3 g of sample and only 5 to 12 min for the test. This instrument can be used in research, plant breeding, and product development. It could also prove useful for on-line process quality control in food industry. PHR

MILLETS

Barley

- 2554 Aalto (T), Lehtonen (M) and Varo (P). Dietary fiber content of barley grown in Finland. *Cereal Chemistry* 65(4); 1988; 284-286

The dietary fiber content in 118 samples of two-and six rowed Finnish barley var. grown in three different locations was determined gravimetrically as the sum of water-insoluble and water-soluble dietary fiber. Total dietary fiber content of the individual var. ranged from 15.0 to 24.1%, water-insoluble dietary fiber from 11.1 to 19.2% and water-soluble dietary fiber from 3.3 to 5.9%. The mean total dietary fiber of the two-rowed var. (19.9%) was slightly lower than that of the six-rowed var. (20.9%). One-fourth of the total dietary fiber in the two-rowed and one-fifth in the six-rowed var. was water soluble. The location of growth had only a minor effect on the fiber content of barley. AS

Corn

- 2555 Gunasekaran (S). Evaluation and comparison of Wisconsin and Stein breakage testers on corn. *Cereal Chemistry* 65(4); 1988; 287-291

Breakage susceptibilities (BS) of two corn genotypes, each dried at four temp. were investigated using the Wisconsin breakage tester (WBT) and the Stein CK-2M breakage tester (SBT) at various operating conditions. Particle size characteristics of the samples impacted with the WBT and the SBT were determined using a set of U.S. standard sieves. The BS and fineness modulus were independent of sample feed rate in the WBT. In the SBT, BS increased and FM decreased with increasing impacting times. Six min. of impacting in the SBT produced

corn breakage levels approx. equivalent to those in the WBT. Based on the wide variations in the results it appears that correlation between actual corn breakage and BS values obtained with the WBT and the SBT may depend on the type of handling, and this may have implications for those who wish to use a breakage test as an information factor in U.S. corn grading factors. AS

- 2556 Wu (YV). Recovery of stillage soluble solids from corn and dry-milled corn fractions by high-pressure reverse osmosis and ultrafiltration. *Cereal Chemistry* 65(4); 1988; 345-348

High-pressure reverse osmosis (RO) combined with ultrafiltration (UF) was used to separate stillage solubles from corn and dry-milled corn fractions into small vol. of conc. solutions and large vol. of permeates suitable for reuse. The UF permeate at 680 kPa (100 psi) contained 23-60% of total N and 38-65% of total solids of the stillage solubles. The UF permeate was used as the feed solution for RO. The RO permeate at 6,800 kPa (1,000 psi) contained 0.32-1.3% of the total N, 0.13-0.41% of total solids and 77-86% of total vol. of the UF permeate. The percentage of N and solids from stillage solubles, that can be economically recovered by combined UF and RO at 6,800 kPa (assuming only the amount of N and solids in the RO permeate is discarded) is 99.6-99.9% and 99.8-99.9%, resp. Conductivity of the RO permeate at 6,800 kPa was lower than that of tap water. UF and high-pressure RO methods developed for stillage solubles from corn and dry-milled corn fractions may encourage increased use of distillers grains from corn and corn fractions while reducing the total cost of the alcohol process. AS

Sorghum

- 2557 Moss'e (J), Huet (J-C) and Bandet (J). The amino acid composition of whole sorghum grain in relation to its nitrogen content. *Cereal Chemistry* 65(4); 1988; 271-277

Sorghum grains (12 samples from seven different lines or hybrid) with total N content ranging from 1.5 to 3 g/100 g grain DM were accurately analyzed for their amino acid composition from six different hydrolysates per samples. Amino acid levels in grain increased as linear functions of N, with correlation coeff. close to one for most amino acids regardless of sorghum genotype or phenotype. As a result, the amino acid composition of any grain sample of normal sorghum can be predicted from its N. Amino acids in grain protein changed as hyperbolic functions of N, which increased for alanine, leucine, isoleucine, phenylalanine, and glutamine plus glutamic acid, remained constant for serine, tyrosine, tryptophan, and asparagine plus aspartic acid, and decreased for the other amino acids. The non protein to total N ratio remained practically constant and close to 5%, and the N-to-protein conversion factor (K^A) was close to 5.81 within the N range investigated. The results also showed that the composition of storage proteins accumulated in sorghum grain remained constant, with the rate of deposition of kafirins roughly 1.5 times that of glutelins. AS

Sorghum flour

- 2558 Lu (S) and Walker (CE). Laboratory preparation of ready-to-eat breakfast flakes from grain sorghum flour. *Cereal Chemistry* 65(4); 1988; 377-379

Sorghum ready-to-eat breakfast cereal flakes was produced by a simple, low technology process. It was acceptable and palatable to many people as indicated by the sensory evaluation and consumer survey. Further improvement and development on commercial-scale is recommended. CMS

PULSES

- 2559 Hamza (MA), Stegemann (H) and Shehata (AET). Proteins in various legumes seeds. Electrophoretic comparison after optimized extraction. *Food Chemistry* 28(2); 1988; 117-127

Seed proteins of seven legume genera (of twelve cv) were compared within one gel under different conditions. Meal preparation using a centrifuge mill and dry ice and extraction using ultrasonication proved to be most effective. Also the conversion of protein to monomers by treatment with SDS in an ultrasonic bath at low temp. yielded somewhat sharper bands compared to the usual boiling procedure. Extraction was by water, buffer or directly by SDS. The water extract differentitated between genera and cvs better than the other two extractants. Standard PAGE for crude water extracts showed patterns, characteristics was achieved by PAGIF in thin-layer gel after dialysis or after loading with SDS. PAGIE gave the best resolution. AS

- 2560 Saini (HS). Extractability and evaluation of Alpha-galactosides of sucrose in leguminous seeds. *Food Chemistry* 28(2); 1988; 149-157

The levels of sucrose and Alpha-galactosides of sucrose in a range of leguminous seeds extracted by various procedures and analysed by the gel-permeation technique are reported. Cowpeas contained the highest levels of Alpha-galactosides, dry wt. basis, the lowest levels being recorded in chickpeas. Levels in lupins are almost comparable with soybeans and intermediate quantities have been measured in adzuki beans. All the legumes examined contained varying amounts of Alpha-galactoside-hydrolysing enzyme (Alpha-galactosidase EC 3.2.1.22) and the defatting process has no effect on its activity. AS

Chickpeas

- 2561 Bansal (KK), Dhindsa (KS) and Batra (VIP). Trypsin inhibitor and hemagglutinin activities in chickpea (*Cicer arietinum* L.). Effects of heat and germination. *Journal of Food Science and Technology, India* 25(1); 1988; 46-48

Chickpea (*Cicer arietinum* L.) seeds of five different cvs were analyzed for trypsin inhibitor activity and hemagglutinin activity and

the effects of heat treatment and germination on the activities of these antinutritional factors were investigated. Activities of these factors were at the same level among the cvs studied. Heat treatment and germination decreased the activities of both trypsin inhibitor and hemagglutinin. Trypsin inhibitor activity was eliminated completely by heating chickpea seeds in boiling water for 20 min. Complete elimination of the low level of hemagglutinin activity could be achieved by dry heating for 1 h, heating in boiling water for 10 min and on germination of seeds for 8 days. Overnight soaking of seeds in water removed as much as 23% of trypsin inhibitor and 50% of hemagglutinin activity. AS

- 2562 Hundal (IK) and Hira (CK). Lysine absorption from chickpea (*Cicer arietinum*) and milk-supplemented wheat diets at two levels of energy. *Journal of Agricultural and Food Chemistry* 36(1); 1988; 116-118

Nine young adult girls were fed diets containing wheat, wheat and chickpea, or wheat and milk at each of the two energy levels of 1600 and 1900 kcal/day. Lysine was estimated in food and feces. From a balance study, N balance, true digestibility (TD), biological value (BV), and net protein utilization (NPU) were calculated. Results indicated that lysine excretion was negatively correlated with lysine intake. Percent lysine absorption was significantly higher ($P < 0.01$) from high-energy diets. Percent lysine absorption was significantly related to dietary protein sources. At the lower, but not at the higher level of energy consumption lysine absorption was significantly related to N balance, BV, and NPU of the diets. AS

French beans

- 2563 Kermasha (S), van de Voort (FR) and Metche (M). Changes in carbonyl compounds in the French bean as a function of cooking and enzyme treatment. *Journal of Agricultural and Food Chemistry* 36(1); 1988; 133-137

Efforts were made to determine quantitatively and qualitatively the changes in volatile and total carbonyl compounds assured to be associated with flavour as a function of cooking and the addition of endogenous flavours enzyme to the cooked French bean seed. Thermal treatment of the beans resulted in increased levels of both volatile and total carbonyls with a corresponding decrease in longer chain carbonyl compounds. These changes were accentuated by the incubation of whole cooked beans in the enzyme extract obtained from germinated beans particularly indicating the appearance of two dienals (C and C). It appeared that the enzyme treatment of the cooked bean resulted in changes similar to cooking of the bean for a prolonged period. MVG

Moth beans

- 2564 Pdwar (VD) and Ingle (UM). Effect of germination on the functional properties of moth beans (*Phaseolus aconitifolius* Jacq) flours. *Journal of Food Science and Technology, India* 25(1); 1988; 7-10

The effect on germination on functional properties of moth bean flour was studied. Moth bean was germinated for 0, 24, 48 and 72 h, ground and the functional properties (water and oil absorption capacity, gelation, nitrogen solubility foaming and emulsion properties) of flours were determined. Results showed that germination improved all the functional properties. Nitrogen solubility profile foaming and emulsion capacities of germinated moth bean flour were not significantly different from the control at any pH studied except for a slight increase at pH 4.5. MVG

Yam beans

- 2565 Paull (RE) and Chen (NJ). Compositional changes in yam bean during storage. *HortScience* 23(1); 1988; 194-196

This work was undertaken to determine the compositional changes in the root during storage and to provide data to assist in making storage recommendation. BAP

OILSEEDS AND NUTS

Cottonseeds

- 2566 Fisher (GS), Frank (AW) and Cherry (JP). Total gossypol content of glandless cottonseed. *Journal of Agricultural and Food Chemistry* 35(1); 1988; 42-44

This paper reports the presence of total gossypol (TG) in gland-free cottonseed kernels. Thinly sliced kernels were examined with a microscope to assure complete absence of glands and analyzed by a modification of the official AOCS method, which can detect less than 1 p.p.m. TG. Although sound, gland-free kernels from five var. contained much less than 1 p.p.m. of TG, those from each of nine var. averaged 2 - 7 p.p.m. TG, with over 10 p.p.m. in one samples. All var. meet the National Cottonseed Products Association's Standard for Grade AAA seed (i.e. not to exceed 10 p.p.m. TG) if glanded seeds are rigorously excluded. On the basis of a 1.25 g sample of cottonseed, 10 glands would contribute about 1 p.p.m. of TG. Moldy and discoloured kernels, in which no glands were visible, contained more TG than normal kernels. AS

- 2567 Zhuge (Q), Posner (ES) and Deyoe (CW). Production study of a low-gossypol protein product from cottonseed meal. *Journal of Agricultural and Food Chemistry* 36(1); 1988; 153-155

A process was developed to reduce the level of free gossypol in cottonseed meal from either an oil extraction or an expelling process. The level of free gossypol reached was below the max. allowable in edible meal according to federal regulations (0.045%). The process included extrusion, drying, fine grinding, and air classification. The final coarse product, with particle size larger than 84 μ m, and a yield ranging from 67 to 80% by wt. of the original raw material,

had a protein content of 36.6-45.2%. AS

Groundnut flour

- 2568 Rahma (EH) and Mostafa (MM). Functional properties of peanut flour as affected by different heat treatments. *Journal of Food Science and Technology, India* 25(1); 1988; 11-15

The functional properties such as emulsification capacity (EC), water and fat absorption capacities (WAC, FAC) and foam capacity (FC) and stability of raw, dry heated (100, 120, 140 and 160 °C for 15, 39, 45 and 60 min.) autoclaved (121 °C for 5 to 30 min) and exposed to different doses of radiation, were studied in defatted flours. These heat treatments increased WAC and FAC the increase being more at higher temp. and longer times of heating. Radiation also increased the above two parameters. The dry heat, moist heat and radiation decreased the EC of the flour, the effect being more pronounced with moist heat, FC of the flours were decreased due to dry heat and moist heat, but in irradiated flours the decrease was less. MVG

Rapeseeds

Rapeseed proteins

- 2569 Sendfeld (A), Fiebig (HJ) and Aitzetmuller (K). Determination of total glucosinolate content in rapeseed by ion chromatography of enzymatically released sulphate. *FAT Science and Technology* 90(3); 1988; 83-85

An alternative approach for the detn. of the total glucosinolate content in rapeseed is presented. Like glucose, sulphate is released in equimolar amounts by enzymatic degradation of glucosinolates. In the extracts, sulphate ion can quickly and accurately be determined by quantitative ion chromatography. AS

Safflower seeds

- 2570 Irving (DW), Shannon (MC), Breda (VA) and Mackey (BE). Salinity effects on yield and oil quality of high-linoleate and high-oleate cultivars of safflower (*Carthamus tinctorius* L.). *Journal of Agricultural and Food Chemistry* 36(1); 1988; 37-42

Soybeans

- 2571 Bruckner (J), Mieth (G), Zdziennicki (AK) and Gwiazda (S). Influence of sunflower flour on the extrusion behaviour of soy grits and the functional properties of the extrudates. *Nahrung* 31(10); 1987; 1037-1039

Soy proteins

- 2572 David Deeslie (W) and Cheryan (M). Functional properties of soy protein hydrolysates from continuous ultrafiltration reactor. *Journal of Agricultural and Food Chemistry* 36(1); 1988; 26-31

Selected functional properties of a soy protein hydrolysate produced in a continuous ultrafiltration reaction have been studied with special attention to the interrelations among properties like solubility, clarity, water binding, foaming, emulsification, flavour and primary bitterness. The performance of the bioreactor as reflected by changes in substrate conversion and mol. wt. distribution of hydrolysate fractions was also studied. MVG

- 2573 Shimada (K) and Cheftel (JC). Determination of sulphhydryl groups and disulphide bonds in heat-induced gels of soy protein isolate. *Journal of Agricultural and Food Chemistry* 36(1); 1988; 147-153

Thermally induced gels were prepared from dispersions of soy protein isolate at varying protein concn., pH, and heating intensity. Increasing protein concn. (0.9-18.2%), pH (7-10), or temp. (80-120 °C) caused (1) a decrease in the content of free SH groups (from an initial 8 μ mol/g of protein) and in the protein solubility of gels (in Tris-glycine buffer), (2) no change in the half-cystine content (-100 μ mol/g of protein), and (3) an increase in gel firmness. Heating at 130 °C caused (1) an increase in the content of free SH groups and in the protein solubility of gels, (2) a decrease in the half-cystine content, and (3) a decrease in gel firmness. These data and the severely reduced firmness of gels formed in the presence of N-ethylmaleimide suggest that newly formed additional S-S bonds and/or SH-induced S-S interchange reactions contribute markedly to the strengthening of gels observed at alkaline pHs or at high temp. (115-120 °C). At or above 130 °C the partial breakdown of S-S bonds (with half-cystine losses) may contribute to gel softening. AS

Sunflower seeds

Sunflower proteins

- 2574 Kabirullah (M) and Wills (RBH). Foaming properties of sunflower seed protein. *Journal of Food Science and Technology, India* 25(1); 1988; 16-19

The foaming properties of untreated sunflower seed and sunflower seed protein products were studied under different conditions. Results show that the foaming properties of sunflower protein isolate (SPI) were similar to that of soy protein isolate. However, sunflower seed flour showed lower foaming properties than that of SPI due to lower amount of protein and the presence of carbohydrate and chlorogenic acid. The foaming properties increased with increase of pH and protein concn. Stirring for longer time increased foam stability and increased stirring speed increased foam expansion. Sodium chloride increased foaming properties possibly increasing protein solubility, sugar decreased the foaming properties of SPI significantly. MVG

TUBERS AND VEGETABLES

Bulbs

Onions

- 2575 Thamizharasi (V) and Narasimham (P). Water vapour losses from different regions of onion (*Allium cepa* L) bulb during storage. *Journal of Food Science and Technology, India* 25(1); 1988; 49-50

Water vapour loss from different regions of onion bulb during storage for 45 days at (i) 21-35 C, RH 2%, and (ii) 21-35 C (ambient RH 50-80) were determined by blocking the neck and base regions. Onions stored at (i) showed max. loss of water vapour when both neck and base were blocked, whereas in onions stored at (ii), the losses showed the reversed trend. Further, contrary to the established belief that loss of water vapour occurs mainly through the neck region of the bulb, it was found that it is largely through the sides although losses do occur through neck and base regions. Of the total loss that occurred in the first three days, 41% was from the side, which increased to over 90% during the 45 days storage under both conditions. AS

Root vegetables

Carrot

Carrot juices

- 2576 Jimenez (L) and Lombrana (JI). Studies on vacuum drying and freeze drying of carrot juices. *Flussiges Obst* 55(6); 1988; 327-330(311-312) (De).

Investigates the influence of load, absolute pressure and heating temp. in freeze-drying and vacuum-drying cycles in carrot juice processing in order to determine the optimum processing conditions from an apparatus performance of view. BV

Sugar beet

- 2577 Ludwicki (M) and Wawro (S). Dry matter content of pulp press water as an indicator of sugar extraction from sugar beet cossettes. *Industries Alimentaires et Agricoles* 104(7/8); 1987; 635-637 (Fr).
- 2578 Niel (JM). Production of sugar beet cossettes. *Industries Alimentaires et Agricoles* 104(7/8); 1987; 623-632 (Fr).

Technique of sugar beet slicing is described. BV

- 2579 Roche (M) and Taccard (M). The market for dehydrated sugar beet pulps analysis and recent developments. *Industries Alimentaires et Agricoles* 104(7/8); 1987; 673-678 (Fr).

Tubers

Potatoes

- 2580 Leszczynski (W) and Lisinska (G). Influence of N fertilization of chemical composition of potato tubers. *Food Chemistry* 28(1); 1988; 45-52

The present study is focused on the changes in chemical composition of potato tubers (14 var.) affected by increased dose of N fertilizers. Intensified N fertilization decreased the content of DM and starch in potato tubers. Moreover, it increased N content in DM and in non-starch dry substance of the potato tubers. N fertilization also increased the content of protein N in DM of potato tubers but decreased its contribution to total N. N fertilization consequently increased the content of amide and amino acid N in potato DM and total N. Increased levels of N fertilizers were followed by an increase in amino acid content detn. in the hydrolyzates of raw potato flesh. No effect of N fertilization on essential amino acids in conversion to crude protein has been observed. AS

Sweet potatoes

- 2581 Chandler (LA) and Schwartz (S J). Isomerization and losses of trans-Beta-carotene in sweet potatoes as affected by processing treatments. *Journal of Agricultural and Food Chemistry* 36(1); 1988; 129-133

The quantitative changes in isomeric composition of Beta-carotene as a results of blanching, canning, dehydrating and cooking were studied. The change was dependent upon the treatment employed; blanching (4.0 -11.9% increase), lye peeling and pureeing (10.4% increase), steam injection (8.0% loss), canning (19.7% loss), dehydration (20.5% loss), microwaving (22.7% loss) and baking (31.4% loss). Increase in carotene content was attributed to an enhanced extraction efficiency of heat treated samples. Heat processing induced the formation of predominantly the 13-cis-Beta-carotene isomer, and the quantity formed was related to the severity and length of the heat treatment. MVG

Vegetables

- 2582 Mandhyan (BJ), Abroal (CM) and Tyagi (HR). Dehydration characteristics of winter vegetables. *Journal of Food Science and Technology, India* 25(1); 1988; 20-22

Drying constants of which vegetables like peas, spianch, carrot and cabbage dehydrated in the sun and the solar cabinet dryer, were calculated. Results show that the rate of moisture depletion in all the vegetables was high in the begining and declines later. The moisture depletion in time indicated a straight line function. With solar cabinet dryer, the drying time decreased by 15 to 20% as compared with direct studying. MVG

Leafy vegetables

- 2583 Barbeau (WE) and Kinsella (JE). Ribulose biphosphate carboxylase/oxygenase (Rubisco) from green leaves-potential as a food protein. *Food Reviews International* 4(1); 1988; 93-127

This review discusses rubisco identity and occurrence in nature, enzymatic role, composition and structure, quaternary structure, form of rubisco present in some bacteria, in vivo synthesis of rubisco, physical and structural aspects of rubisco, amino acid composition of rubisco from different plant species (alfalfa, spinach), subunit interactions, isolation methods and yields, factors affecting yields, potential of rubisco as a food protein (nutritive value), and functional properties (solubility, gelation and water and fat absorption, emulsifying properties, foaming and whipping properties). 108 references. BV

Alfalfa juice

- 2584 Hernandez (A), Martinez (C) and Gonzalez (G). Effects of freezing and pH of alfalfa leaf juice upon the recovery of chloroplastic protein concentrates. *Journal of Agricultural and Food Chemistry* 36(1); 1988; 139-143

Alfalfa juice, on extraction, was frozen stored at -25 C for different storage times after previously adjusted the pH to 8.0, 8.5 and 9.0 leaving natural pH 6.0 as control. Results showed that at those alkaline pH values more total dry matter and N were recovered in the green concn. than at natural pH though the concn. have a lower protein content. Also, increasing storage time decreased the recovery of the green concn. possibly one to a change in the conformation of membrane proteins which was more intense as the storage time was higher. MVG

Lettuce

- 2585 Moharram (YG), Hamza (M) and Abd El-Aal (MH). Lettuce leaf protein. Composition functional properties and utilization. *Nahrung* 31(10); 1987; 941-948

The study of the composition, properties and utilization of lettuce leaf protein conc. indicated that it has low level of ash and crude fiber, high protein content (70%) and considerable amount of the essential amino acids; the lowest nitrogen solubility, occurred between pH 3 and 5; a good water and fat absorption, emulsification capacity and low foaming and gelation properties and resistant to heat denaturations. BV

Spinach

- 2586 Hebrero (E), Santos-Buelga (C) and Garcia-Moreno (C). Changes in thiamin content during the storage of Spinach. *Journal of Agricultural and Food Chemistry* 36(1); 1988; 144-147

Changes of vitamin B1 in fresh and frozen spinach subjected to different storage conditions were studied in order to observe how this vitamin was affected in such conditions. The possible suitability of this vitamin as an indicator of the shelf life and quality of this kind of vitamin was also evaluated. In spinach originally frozen but stored at room temp. The vitamin content decreased after showing an initial increase. In fresh spinach stored both at room temp. and under refrigeration, the vitamin decreased throughout. This it appeared that this vitamin could possibly considered only as an indicator of the quality and shelf life of fresh spinach. MVG

Tomatoes

- 2587 Inaba (M) and Chachin (K). Influence of and recovery from high-temperature stress on harvested mature green tomatoes. *HortScience* 23(1); 1988; 190-192

Most tomatoes (mature green) in tropical and subtropical areas are affected by high temp. stress, because day time field temp. are as high as 40 C and fruit temp. may become 5 to 10 C higher than ambient temp. Often this temp. is retained within the fruit even after harvesting due to lack of cold storage facilities and lack of sufficient information about proper handling. The objective of the study was to obtain detailed information on the effects of and recovery from high-temp. stress on harvested tomatoes and to control the postharvest losses in tomatoes due to improper ripening behaviour caused by high preharvest temp. in tropical and subtropical areas. BAP

- 2588 Watkins (CB), Haki (JM) and Frenkel (C). Activities of polygalacturonase, Alpha-D-mannosidase, and Alpha-D- and Beta-D-galactosidases in ripening tomato. *HortScience* 23(1); 1988; 192-194

The activities of the enzymes polygalacturonase, Alpha-D-mannosidase and Alpha-D and Beta-D-galactosidase in tomato (*Lycopersicon esculentum* Mill) pericarp tissue were measured during ripening of two normal ripening cvs, Sweet -100' and ACE 55 VF' the slow ripening alcobaca mutant and their F₁ progeny. The activity of polygalacturonase increased as the fruit ripened in all the var. of the other enzymes, Alpha-D-mannosidase showed the greatest quantitative differences between the tomato var. and consistently increased its activity as the fruit, ripened from green to red colour. The highest Beta-galactosidase occurred in 'Sweet-100' but was generally similar in other var. BAP

Vegetable juices

- 2589 Schmitt (R). Optimized enzyme system for the production of carrot juice and other vegetable juices. *Flussiges Obst* 55(6); 1988; 309-310(321-323)

FRUITS

- 2590 Ibiyemi (SA), Abiodun (A) and Akanji (SA). *Andersonia digitata* Bombax and *Parkia filicoides* Welw. Fruit pulp for the soft drink industry. *Food Chemistry* 28(2); 1988; 111-116

Both *Andersonia digitata* Bombax and *Parkia filicoides* Welw fruit pulps are very nutritive; *Parkia* fruit pulp contains 1.71% w/w total sugar and 7.3 mg/100g ascorbic acid while *Andersonia* fruit pulp contains 1/41% w/w total sugar and 10.3 mg/100g ascorbic acid. Both pulps are found to deteriorate fast when exposed even to a limited humid air supply and this occurs surprisingly, even when each pulp is kept intact in the pod. Addition of sodium metabisulphite effectively preserves each against heat and light effects. AS

Figs

- 2591 Steiner (WE), Rieker (RH) and Battaglia (R). Aflatoxin contamination in dried figs. Distribution and association with fluorescence. *Journal of Agricultural and Food Chemistry* 36(1); 1988; 88-91

Naturally contaminated batch of figs (400 single figs and samples totalling 90 Kg) were analysed for aflatoxin distribution. Results showed only a small number of figs were contaminated, the levels of contamination, however, being very high in individual figs. The degree of contamination was estimated to be ca 1 in 100. Bright greenish yellow (BGY) fluorescence under UV light (365) nm was strongly correlated with the occurrence of aflatoxin contamination qualitatively (and not quantitatively). Removal of all BGY fluorescent figs from a 56 kg sample effectively lowered the original contamination level from 22.6 to 0.3 p.p.b aflatoxin B. The procedure of sorting is simple and fast, and can be easily used to effectively clean large batches of dried figs on an industrial scale. Presence of aflatoxin producing strains of *Aspergillus flavus* and *Aspergillus parasiticus* was revealed by microbiological investigation. MVG

Mangoes

- 2592 Macleod (AJ) and Snyder (CH). Volatile components of mango preserved by deep freezing. *Journal of Agricultural and Food Chemistry* 36(1); 1988; 137-139

Mango slices were stored for 14 months in a deep freeze at -15 C and then analyzed for their volatile aroma components. Results were remarkably similar to those obtained for the fresh fruit, although the amount of the important constituent, car-3-ene, was slightly reduced. The plasticizer, di-2-ethylhexyl adipate, was also detected in the aroma isolate, originating by migration from the PVC film in which the fruit was wrapped while in storage. AS

- 2593 Palejwala (VA), Patki (CK), Bhatt (SV) and Modi (VV). Post-harvest spoilage of mangoes by *Aspergillus niger*. *International Journal of*

Food Microbiology 5(2); 1987; 111-116

A fungus, identified to be *Aspergillus niger* var. Tieghem (IMI No. 29005) was isolated from a spoiled ripe mango. Artificial infection studies showed that the fruits were susceptible to infection at all stages of ripeness. Various biochemical factors that could render the fruits susceptible to attack by this mold were investigated. The mold grew optimally at pH 3.0 citric and malic acids, at concn. present in the unripe fruits were found to enhance its growth. The mold was able to utilize starch, sucrose, fructose and glucose for its growth. The level of hydrolytic enzymes viz. amylase invertase and cellulase in mangoes, increased while the content of total carbohydrates, sucrose, glucose and fructose decreased upon spoilage. AS

- 2594 Spalding (DH) and Von Windeguth (DL). Quality and decay of irradiated mangoes. HortScience 23(1); 1988; 187-189

Irradiation is used commercially in South Africa at a dosage of 750 Gy (1000 Groups=100 Krad) for quarantine treatment of mangoes infested with the seed weevil. Experimental irradiation of two major 'Florida' mango cvs (Tommy Atkins and Keitt) at a dosage of 750 Gy resulted in peel injury in 15% of Tommy Atkins and 29% of 'Keitt' mangoes. Other tests showed inhibition of ripe peel colour development in 'Tommy Atkins' mangoes irradiated at 750 Gy. The objective of this study was to determine the effects of irradiation at a wider range of dosages (150 to 1500 Gy) on quality and decay of 'Tommy Atkins' and 'Keitt' mangoes. Various irradiation dosage levels to control insect and fungal infestation in the above mango var. is described with results. BAP

Peaches

- 2595 Rahma (EH) and Abd E-Aal (MH). Chemical characterization of peach kernel oil and protein. Functional properties, in vitro digestibility and amino acids profile of the flour. Food Chemistry 28(1); 1988; 31-43

Kernels of peach fruits are rich in oil and protein (54.5% and 27.5% resp.) but are quite low in carbohydrate content. Total lipid contained 98% triglycerides, 0.41% sterols and 1.1% polar lipids. Fatty acid composition revealed the presence of oleic (63.8%), linoleic (15.4%) and saturated fatty acids (20.7%). The defatted flour showed good fat absorption and emulsification properties by water absorption and foaming properties were slightly low. The solubility of protein was high at both acidic and alkaline pH with a min. solubility at pH 4.3. Albumins were the major protein fraction (60%). The protein was highly digested by pepsin-pancreatin followed by pancreatin and pepsin, and the lowest digestibility was by trypsin. The protein is rich in lysine, leucine, isoleucine, valine, threonine, basic and acidic amino acids but poor in methionine. UJSPR

CONFECTIONERY, STARCH AND SUGAR

Starch

- 2596 Ring (SG), Gee (JM), Whittam (M), Orford (P) and Johnson (IT). Resistant starch. Its chemical form in foodstuffs and effect on digestibility in vitro. *Food Chemistry* 28(2); 1988; 97-109

The chemical forms and resistance to hydrolysis in vitro of raw and gelatinised starch from peas, maize, wheat and potatoes were measured. Raw granular starch proved very resistant to amylolysis. Only wheat starch was fully degraded after 24 h incubation with amylase (20 units/mg polysaccharide) at 37 C. In contrast, hydrolysis of freshly gelatinised starches was essentially complete within 1 h. To investigate the onset of resistance to hydrolysis after gelation, dispersions of amylose and amylopectin were stored at 20 C prior to amylolysis. Retrogradation of amylose was rapid, and the resulting material was highly resistant to amylolysis. In contrast, amylopectin underwent retrogradation more slowly and was almost completely degraded by amylase after incubation for 24 h. The onset of resistance of starch-hydrolysis in an amylose-rich food (cooked peas) was confirmed using a simulated digestion technique. AS

Sugar

- 2597 Lavroff (S). Manufacture of amylaceous sugar. *Industries Alimentaires et Agricoles* 104(7/8); 1987; 687-688 (Fr).

Describes a process for manufacture of icing sugar with addition of starch as an anti-caking agent. BV

Sugarcane juices

- 2598 Mann (RS) and Singh (S). Processing packaging and preservation of sugarcane juice. *Indian Farming* 37(12); 1988; 15-17

Aspects covered include processing of sugarcane juice, susceptibility to fermentation; control of spoilage of freshly-drawn sugarcane juice by chilling, thermal processing; flavour improvement; dilution; pH adjustment; flavouring; fortification with milk and whey and final formulation shelf life. BV

BAKERY PRODUCTS

- 2599 Smith (JP), Ooraikul (B), Koersen (WJ), Van de Voort (FR), Jackson (ED) and Lawrence (RA). Shelf life extension of a bakery product using ethanol vapour. *Food Microbiology* 4(4); 1987; 329-337

This study demonstrates the usefulness of ethanol vapour for shelf life extension of a fruit filled bakery product. Ethanol vapour

incorporated into packaged product, yeast growth was completely suppressed and all packages appeared normal at the end of the 21 days storage period. Ethanol vapour can be generated without spraying ethanol solutions directly on to products prior to packaging. Sachets can be conveniently removed from packages and discarded at the end of storage period. It eliminates the need to use preservatives such as benzoic acid or sorbic acid to control yeast fermentation and it is inexpensive. BV

Biscuits

- 2600 Rajput (LP), Haridas Rao (P) and Shurpalekar (SR). Use of unconventional protein sources in high protein biscuits. *Journal of Food Science and Technology, India* 25; 1988; 31-34

Laboratory studies on the preparation of high protein biscuits indicated that some of the unconventional protein sources such as mustard protein conc. (MPC), cottonseed flour (CSF) or cottonseed protein isolate (CSPI) could be conveniently used to increase the protein content in biscuits from 5.9 to 11.3-18.1%. In general, incorporation of different protein conc. affected the crispness, taste and overall acceptability, as indicated by the sensory scores but increased the spread ratio and spread factor, which depended on the level of incorporation. The optimum level of incorporation was found to be 15% in case of MPC or CSPI and 10% in case of CSF. The quality of high protein biscuits could be improved by incorporation of 0.5% sodium stearoyl-2-lactylate in the formulation. AS

Bread

- 2601 Baker (AE), Walker (CE) and Kemp (K). An optimum compression depth for measuring bread crumb firmness. *Cereal Chemistry* 65(4); 1988; 302-307

Bread firmness evaluation with the Instron Universal Testing machine was performed on two distinctly different bread formulations and over a period of time in order to evaluate the sensitivity of various compression depths. The standard AACC method 74-09 was modified so that the firmness was measured at 5, 10, 20, 25 and 30% of the 25mm thick sample. A 3 X 2 X 2 factorial design was used, and the data were analyzed for variance and significant differences. As the degree of compression increased, so did the variability. This can be interpreted to mean increased sensitivity to changes in crumb firmness. Further analysis revealed that the 25% compression depth was most effective detecting significant differences in firmness due to staling and bread formulation. The characteristics of the resulting compression curve are also discussed. AS

- 2602 Martinez-Torres (C), Taylor (P), Leets (I), Tropper (E), Ramirez (J) and Layrisse (M). Iron absorption from maize bread. *Food and Nutrition Bulletin* 9(4); 1987; 62-69

A comprehensive review of published data on maize iron absorption as well as information collected during the past four yr with special emphasis on iron absorption from precooked maize flour eaten

alone and with meals. BV

- 2603 Pechanek (U) and Pfannhauser (W). Fundamentals for the production of high dietary fibre breads. Part 1. Dietary fibre content of different raw materials. *Getreide, Mehl und Brot* 42(4); 1988; 120-123 (De).

Ash, water-soluble and insoluble fibre content of different raw materials viz., flour fraction of different extraction grade and semolina from wheat, rye and bran from wheat, rye, soy, peas, beans and seed coat from a few edible seeds including oilseeds (sesame, linseed, sunflower) and other baking additives including gluten, potato flour protein etc. have been reported. The fibre content of wheat and rye flours increased linearly with their ash content. The proportion of ash to dietary fibre was however different due to the differences in the separability of their peripheral layers. At similar ash contents the flour products from rye contain more fibre than from wheat. Among bran from different grains, that from peas is well suited as additive for bread with 82% fibre content, double than that of rye bran (38%). The data on various products are useful in achieving a desired level of dietary fibre in bread and other baked products. Possibilities of using non-conventional sources like seed coats of hazel nut, coffee, and cocoa etc. have been indicated. SZA

- 2604 Seiffert (M). Manual production of bread and roll specialities of "Gersterbrot" type. *Getreide, Mehl und Brot* 42(4); 1988; 116-120 (De).

"Gerstern" is an old German process for making a speciality bread from rye flour mixed with 20-30% wheat flour. It consists of heating the shaped dough piece in an open-fire oven (burning wooden logs of beech tree on either side of oven as in ancient days) for a very short time before normal baking. This imparts a characteristic mottled-skin surface to the bread with typical aroma and taste. The paper describes use of a small tubular "Gerster oven" for present days, fitted with gas burners inside to give direct flame heat to the dough piece, and also a process for making very small sized specialities using a hand burner (soldering burner) for heating. Recipes for various types of speciality bread by this process have been given. SZA

Confectionery

- 2605 Belton (PS), Saffa (AM), Wilson (RH) and Ince (AD). The potential of Fourier transform infrared spectroscopy for the analysis of confectionery products. *Food Chemistry* 28(1); 1988; 53-61

The potential of Fourier transform infrared spectroscopy for the analysis of confectionery products was demonstrated using chocolate and cocoa liquors as representative materials. Both photoacoustic and attenuated total reflectance detection methods were used. Both methods gave well resolved signals which could be assigned to fat, protein and sugar. It was found that photoacoustic spectroscopy was the best method for fat analysis. However, attenuated total reflectance techniques were shown to be useful for investigating phase changes occurring in the lipid components during both cooling and storage of chocolate.

AS

Doughs

- 2606 Baker (AE), Doerry (WT), Kulp (K) and Kemp (K). A response surface analysis of the oxidative requirements of no-time doughs. *Cereal Chemistry* 65(4); 1988; 367-372

The effects of three commercially available oxidants on specific internal and external quality characteristics on no-time doughs were examined by response-surface methodology. The oxidant system included azodicarbonamide, ascorbic acid, and potassium bromate. In general, the quality of the loaves improved when ascorbic acid was excluded from the system. However, the addition of ascorbic acid tended to affect the levels of azodicarbonamide and potassium bromate required to obtain the max. quality response. There was a definite interaction among the three oxidants that varied depending on the quality characteristics. AS

Noodles

- 2607 Rho (KL), Seib (PA), Chung (OK) and Deyoe (CW). Noodles. VIII. Investigating the surface firmness of cooked oriental dry noodles made from hard wheat flours. *Cereal Chemistry* 65(4); 1988; 320-326

Centura, a hard red winter wheat cv. was harvested two years in different locations. The wheat flours from both crops showed good noodlemaking and breadmaking performance. When a hard and a soft wheat flour were premixed into an elastic dough and subsequently made into noodles, the surface firmness of the cooked noodles decreased with the period of premixing. Centura and Western white wheat flour gave little gluten development during mixing compared to flour from a commercial mixture of hard red winter wheats. AS

Spaghetti

- 2608 Duszkievicz-Reinhard (W), Khan (K), Dick (JW) and Holm (Y). Shelf life stability of spaghetti fortified with legume flours and protein concentration. *Cereal Chemistry* 65(4); 1988; 278-281

Spaghetti from durum wheat semolina fortified with 10% (w/w) of legume (navy bean and pinto bean) flours or their protein conc. was studied for its stability during storage for 0-6 months. The cooked wt. was lower for fortified samples during storage, but samples with navy bean and its conc. had higher water absorption. The cooking loss decreased during storage. The firmness was higher for spaghetti containing legume flours and conc., when compared with the controls. The sensory test showed that spaghetti fortified with navy bean flour was preferred. AR

MILK AND DAIRY PRODUCTS

- 2609 Fleet (GH) and Mian (MA). The occurrence and growth of yeasts in dairy products. *International Journal of Food Microbiology* 4(2); 1987; 145-155

Yeasts were isolated, identified and enumerated from 161 samples of retail dairy products. Highest yeast populations (up to 10^6 - 10^7 cells/g) were found in yoghurt and cheese samples while lower counts occurred in samples of pasteurized milk, cream, butter and ice cream. *Candida famata*, *Kluyveromyces marxianus*, *Candida diffluens* and *Rhodotorula glutinis* were the most frequently isolated species. The growth of these and other species was demonstrated during the refrigerated storage of cream, butter and cheese samples and by their inoculation and incubation in milk and yoghurt samples. The predominance and growth of these species was probably related to their production of protein and fat hydrolysing enzymes and the ability to grow at 5 °C. AS

- 2610 Onyeneho (SN), Partridge (JA), Brunner (JR) and Guan (J). Manufacture and characterization of Gua-Nai. A new dairy food produced with an oriental-type culture. *Journal of Dairy Science* 70(12); 1987; 2499-2503

This paper describes the manufacturing procedure and standardisation to improve the newly developed dairy based product called Gua-nai as well as the nature of the culture organisms used in the manufacture. This also reports the production procedure and its proximate composition. Gua-nai is a sweet set gel produced from pasteurised whole or skim milk. The organisms were isolated and identified as *Amylomyces rouxii*, *Rhizopus oryzae*, *Aspergillus oryzae* and a single yeast, *Endomycopsis burtonii*. It was seen that Gua-nai distinct flavour and aroma contribute to make it a new addition to the rapidly expanding family of dairy foods and its lack of acid flavour characteristic of dairy products such as yoghurt will make Gua-nai as a non-acid dairy product. No significant differences were noticed between Gua-nai made with commercial wine cake culture and that from isolated microorganisms. NGKR

- 2611 Wong (HN), Chang (MH) and Fan (JY). Incidence and characterization of *Bacillus cereus* isolates contaminating dairy products. *Applied and Environmental Microbiology* 54(3); 1988; 699-702

293 commercial dairy products were examined for incidence of *Bacillus cereus*. 17% of fermented milks, 52% of ice creams 35% of soft ice creams and 2% of pasteurized milks and flavoured pasteurized milks and 29% of milk powders were found to harbour the microbial contamination in the range of 15 to 250 /ml or 5 to 800 /g CFU. All the tested isolates lysed rabbit erythrocytes; 98% showed verotoxicity, 68% showed cytotoxic toxicity for CHO cells and 3 of 11 selected isolates that showed strong hemolysine activity killed adult mice. RJ

Milk

- 2612 Eisses (J) and Dijkman (AJ). A modified Rupp-Wode test for the large-scale testing of farm milk for contamination with disinfectants containing available chlorine. Netherlands Milk and Dairy Journal 41(3); 1987; 201-206

This review describes the procedure for the large scale testing of farm milk for contamination with disinfectants containing available chlorine based on the methods of Rupp and Wode which is in use in the Dutch milk grading system and given in the recent Netherlands Standard NEN 6852. This also covers results of experiments along with sensitivity of the method, influence of ascorbic acid as well as some results obtained in milk grading in practice. NGKR.

- 2613 Griffiths (MW), Phillips (JD) and Muir (DD). Effect of low temperature storage on the bacteriological quality of raw milk. Food Microbiology 4(4); 1987; 285-291

Storage of raw milk at 2 °C resulted in a 1.8 fold increase in storage life compared with that at 6 °C. The length of storage which could be achieved before psychrotroph counts exceeded 1×10^6 /cfu ml⁻¹ in raw milks at both 2 °C and 6 °C was high dependent on initial levels of psychrotrophic bacteria present. If the initial psychrotroph counts was below 1×10^4 cfu ml⁻¹ milks could be stored at 2 °C for 3-6 days without the bacterial count exceeding 1×10^6 cfu ml⁻¹, when initial counts are higher than 1×10^4 cfu ml⁻¹, a thermization treatment of 65 °C for 15s followed by storage at 2 °C is required to give storage lives greater than 72 h. BV

- 2614 Hughes (D) and Sutherland (PS). Evaluation of petrifilm SM for determining bacteriological counts on raw milk by comparison with the standard plate count and micropipette count techniques. Australian Journal of Dairy Technology 42(3/4); 1987; 59-61

This study was carried out to assess the performance of petrifilm SM as an alternative to the conventional plating procedures employed in the Standard Plate Count (SPC) and Micropipette Count (MPC) techniques. This petrifilm SM is a commercial product marketed by 3 M (Australia). This system provides a simple method for performing bacteriological counts by eliminating the need to use molten agar and petridishes and consists of standard methods culture medium coated onto a paper film and over laid with a second transparent film coated with a cold water soluble gelling agent and tetrazolium indicator-dye. The data on 69 samples out of 100 raw milk samples tested for SPC and MPC using both conventional plating methods and petrifilm SM fell within the appropriate colony count range for all 4 methods when statistically analysed. This method is simple and provides considerable savings in time, labour and incubation space. NGKR

- 2615 Mattila (T) and Aliviehmas (T). Automated turbidometry for predicting colony forming units in raw milk. International Journal of Food Microbiology 4(2); 1987; 157-160

The Bioscreen turbidometer was used to study bacterial growth in a laboratory medium inoculated with raw milk. The results showed that the number of colony forming bacteria in milk determined by the plate count method can be estimated from turbidometric parameters of bacterial growth. A formula predicting the bacterial count in raw milk was developed. AS

- 26 16 Payens (TA). Concerning consistent and inconsistent theories of milk clotting. A comment. *Netherlands Milk and Dairy Journal* 41(3); 1987; 289-291

This communication covers comment concerning consistent and inconsistent theories of milk clotting by renneting reaction. It discusses the destabilization model and a truly random attack model for the degradation of the micelles. It is made clear that the degree of randomness in the enzymic attack of the models is also larger with the consistent sources model than with the destabilization model. NGKR

- 26 17 Singh (SP), Singh (P), Sharma (BD) and Prakash (R). Perspectives on milk production, marketing and technology. Global science, national perspective, strategies and future prospects and marketing. *Indian Food Industry* 7(2); 1988; 1-8

Study attempts to discuss some aspects like farm production, composition, distribution systems of marketing and other free technological aspects, etc of milk in National and International perspective. GP

- 26 18 Urbach (G) and Milne (T). The concentration of volatiles in pasteurized milk as a function of storage time and storage temperature—a possible indicator of keeping quality. *Australian Journal of Dairy Technology* 42(3/4); 1987; 53-58

This investigation was carried out to correlate the ethanol (and other volatiles) in the milk with its keeping quality. This has been done by testing the bacteriological quality along with level of volatiles in milk samples drawn at regular intervals. The pasteurised milk was stored at 4, 7, and 19 °C for these experiments until it was found to be unpalatable. The results showed that with marked increase in ethanol the off-flavour with standard plate count in the order of 10^6 to 10^7 cfu/ml increased. This also caused an increase in acetaldehyde and in propan-2-ol where as acetone decreased correspondingly which is dependent on the contaminating organism. NGKR

- 26 19 Van Boekel (MAJS) and Ribadeau-Dumas (B). Addendum to the evaluation of the Kjeldahl factor for conversion of the N content of milk and milk products to protein content. *Netherlands Milk and Dairy Journal* 41(3); 1987; 281-284

This review discusses the consequences of the new data for the Kjeldahl factor for conversion of N content of milk and milk products to protein content. It has been seen that as the amino acid composition is uncertain the Kjeldahl factor is also uncertain as it is

difficult to distinguish between an acidic amino acid from the corresponding amide. The best estimate for the above factor milk was 6.35 and the range suggested was 6.34 - 6.36. NGKR

- 2620 van Hooydonk (ACM) and Walstra (P). A consistent model for the clotting of milk by rennet. *Netherlands Milk and Dairy Journal* 41(3); 1987; 293-295

This communication describes the reply to the comments made on a consistent model for the clotting of milk by rennet. It also suggests improvements in the model by incorporating statistical principles and should be consistent with the experimental results. NGKR

Milk products

- 2621 Rajorhia (GS). Buffalo milk products. *Indian Farming* 37(6); 1987; 52-56

Discusses characteristics of buffalo milk, nutritional significance buffalo milk, preferential uses of buffalo milk, buffalo milk in city milk supply; indigenous milk products, fermented milk products (mistidahi, lassi and shrikhand), fat-rich products from buffalo milk, coagulated milk products (paneer and chhana), other formulated products from buffalo milk, modification of buffalo milk for manufacturing Western type products, concentrated milk products, milk powder and cheese. BV

Butter

- 2622 Dixon (BD). Use of pre-butter fat content in calculation of churning losses. *Australian Journal of Dairy Technology* 42(3/4); 1987; 65

A formula based on readily detn. of composition parameters of the cream, buttermilk and butter was developed to calculate fat losses into the buttermilk during churning cream. This formula avoided the need to make assumptions about overrun percentages which had been the traditional approach in this calculation. A more logical derivation of the simpler formula based on the constancy of the fat content of the pre-butter is described in this paper. NGKR

- 2623 Dixon (BD). A new formula for the calculation of fat losses in churning washed butter. *Australian Journal of Dairy Technology* 42(3/4); 1987; 66-67

This paper describes the development of a practical formula for the calculation of churning losses where butter is washed with water. The approach is to assess the buttermilk in two stages, that deriving from the first separation and that being washed out from the granules. These calculations are based on the churning of 100 kg of cream. NGKR

Cheese

- 2624 de Boer (E) and Kuik (D). A survey of the microbiological quality of blue-veined cheeses. *Netherlands Milk and Dairy Journal* 41(3); 1987;

227-237

In this paper the data on microbiological quality of 256 samples of blue-veined cheeses obtained from the retail trade was surveyed. The main types studied were Danablu, Roquefort and Gorgonzola. The results showed that more than 40% of the samples showed an Enterobacteriaceae count exceeding 100 cfu/g and in 26% of the samples *E. coli* counts exceeded 100 cfu/g. *Salmonella* was absent in many of the samples and *Yersinia enterocolitica* was isolated from 10 of 50 samples analysed. The highest numbers of Enterobacteriaceae and *E. coli* were found in Gorgonzola cheese. As well high numbers of *Staphylococcus aureus* and *Bacillus cereus* were found. *Listeria monocytogenes* was isolated from 2 out of 20 samples, *Debaryomyces hansenii* was the most commonly isolated yeast species. Based on these findings recommendations were made to improve the microbiological quality of the above types of cheese. NGKR

- 2625 Fernandez-Garcia (E), Ramos (M), Polo (C), Juarez (M) and Olano (A). Enzyme accelerated ripening of Spanish hard cheese. *Food Chemistry* 28(1); 1988; 63-80

The acceleration effect of lipolytic, proteolytic, and glycolytic enzymes on the ripening of a Spanish hard cheese made according to Manchego cheese manufacturing methods was studied. The results indicated that proteolytic enzymes caused substantial alterations in the N fractions. The addition of lactase resulted in early hydrolysis of lactose as well as a noticeable increase in the amino acid N fraction. The free fatty acid content increased in cheese treated with lipases. The cheese treated with lactase received the best taste panel rating, and a slightly bitter taste was detected in the cheeses treated with protease. AS

- 2626 Joosten (HMLJ) and Northolt (MD). Conditions allowing the formation of biogenic amines in cheese. 2. Decarboxylative properties of some non-starter bacteria. *Netherlands Milk and Dairy Journal* 41(3); 1987; 259-280
- 2627 Joosten (HMLJ) and Stadhouders (J). Conditions allowing the formation of biogenic amines in cheese. 1. Decarboxylative properties of starter bacteria. *Netherlands Milk and Dairy Journal* 41(3); 1987; 247-258

In this paper the causes for the formation of biogenic amines in cheese were investigated by testing six mixed-strain, mesophilic starter culture (FR 8, FR 18, FR 19, Bos, UR and A). Cheese was manufactured under very hygienic conditions using aseptically drawn, pasteurised and bactofuged milk. The amines were determined after 3, 6 and 12 months of ripening in addition to their microbiological quality. It was seen that both biogenic amines and nonstarter bacteria were virtually absent. In an other experiment these biogenic amines were investigated during normal conditions of cheese manufacture of Massdam type of cheese. They were not detected. It was therefore understood that in Gouda and Maasdam cheese made from pasteurised milk with normal hygienic care biogenic amines are not produced. NGKR

- 2628 Luyten (H), van Vliet (T) and Walstra (P). Note on the shortness of the consistency of Dutch-type cheese. *Netherlands Milk and Dairy Journal* 41(3); 1987; 285-288

This communication discusses the various parameters of samples of cheese to determine its consistency as to the study of salt content, pH, extent of proteolysis, calcium phosphate content, water content, etc. NGKR

- 2629 Venema (DP), Herstel (H) and Elenbaas (HL). Determination of the ripening time of Edam and Gouda cheese by chemical analysis. *Netherlands Milk and Dairy Journal* 41(3); 1987; 215-226

To verify the ripening time of Edam and Gouda cheese a study was made of the relation between the maturity, determined by both chemical and sensory indices, and the ripening time (age) of cheese samples. The study was made with block-cheese in the categories young, young-matured and matured and it focused on the discrimination between these categories or classes. The data of five chemical indices (water-soluble N/total N ratio, 12% TCA-soluble N/total N ratio, NaCl content, moisture content and pH) in series of Edam and Gouda block-cheese and in a series of both cheese types combined were analysed by stepwise multiple linear regression analysis. The first and the last index were reacted in all groups. The multiple correlation coeff. of the series were situated between 0.94 and 0.95. If discrimination between the young and the young-matured class of both Edam and Gouda block-cheeses the 95% confidence level is 12 to 13 days, and 18 days if discriminating between the young-matured and matured class. Sensory panel results were found to give a correlation which was inferior to the ripening time given by the chemical parameters. NGKR

Camembert cheese

- 2630 Roger (S), Degas (C) and Gripon (J-C). Production of phenyl ethyl alcohol and its esters during ripening of traditional Camembert. *Food Chemistry* 28(2); 1988; 129-140

During raw milk Camembert cheese manufacturing, the production of phenyl ethyl alcohol and its esters reached a max. after 1-2 wk of ripening. Thereafter the concn. decreased to a level of about 1 p.p.m. at the end of ripening. Spraying of cheese surfaces with a phenylalanine solution increased the observed maxima, but did not markedly change the concn. at the end of ripening. The detection thresholds of phenyl ethyl alcohol, phenyl ethyl acetate, phenyl ethyl propanoate, detn. in a model curd, were 8, 20, 18 p.p.m (odour thresholds) and 9, 18, 17 p.p.m (taste thresholds), resp. The amounts present in raw milk Camembert ripened for a long period were lower than these mean thresholds, but corresponded to the detection thresholds of the most sensitive panelists. AS

Cheddar cheese

- 2631 Eddy (DW) and Hull (RR). The effect of temperature on the multiplication of *Streptococcus cremoris* bacteriophage NZ104MG. *Aus-*

tralian Journal of Dairy Technology 42(3/4); 1987; 48-52

Bacteriophage NZ104MG multiplied more rapidly on *Streptococcus cremoris* CSCC1357 at temp. used in the cooking stage of Cheddar cheese manufacture (38 °C) than at the low temp. (30 °C or below) used for culture propagation. Raising the temp. from 31 to 38 °C did not alter the burst size, but reduced the period required for intracellular bacteriophage development (latent/rise period), from 70 to 30 min. Cultures grown at 25 °C absorbed 80% of added bacteriophage in 15 min. (rate constant $K = 4.09 \times 10^{-10}$ mL/min.), whereas cultures exposed to 4.5 h of growth at 38 °C in 15 min. absorbed 99.7% (rate constant $K = 2.46 \times 10^{-10}$ mL/min.). Electron microscopic examination showed this phage to be isometric, with a head diameter of 50 nm and a tail length of 150 nm, and zones around phage plaques indicated the presence of phage-associated lysine. AS

Domlati cheese

- 2632 Omar (MM). Composition and microstructure of domlati cheese made from reconstituted UF milk. *Food Chemistry* 28(2); 1988; 85-95

The quality of Domlati cheese made from reconstituted UF milk was improved, compared with that made from reconstituted milk by the conventional method. The clotting time decreased, the coagulum strength and the protein and fat retention increased, and this resulted in firmer coagulum and smoother body. UF cheese had higher moisture, fat in DM, protein in DM, proteolysis of proteins and pH value than conventional cheese. The accumulation of free amino acids was significantly different between the control and the experimental cheese and increased throughout the ripening period. The liberation of free fatty acids showed the same trend in both cheese except for a small increase of free volatile fatty acids in UF cheese which has a good finish and appearance, better consistency and flavour than the control cheese. The microstructures of the cheeses were quite similar and the protein matrix was in a loose and porous structure. The casein network was still recognizable after four months of ripening. AS

Goat cheese

- 2633 Gomez (R), Pelaez (C) and Martin-Hernandez (C). Enzyme activity in Spanish goat's cheeses. *Food Chemistry* 28(2); 1988; 159-165

Specific enzyme activity has been studied in Spanish goat's cheese. Neutral protease, aminopeptidase, and carboxypeptidase activity was analysed during the ripening of two Spanish goat's cheeses. One cheese was Mahorero cheese from the island of Fuerteventura; the other was a soft cheese mould-ripened by *P. candidum* on the surface. The trend in neutral protease activity was rather similar in both cheeses over the ripening period. Protease activity was higher in Mahorero cheese and higher on the surface than inside the mould-ripened cheese. Aminopeptidase activity also increased in both cheeses over the entire ripening period, but it was higher in the mould-ripened cheese than in the Mahorero cheese. Carboxypeptidase

activity was not recorded in either the Mahorero or the soft cheese.
AS

Ras cheese

- 2634 Abo El-Ella (WM), Abdel Baky (AA), Aly (ME) and Fox (PF). Effect of ripening temperatures on proteolysis and lipolysis in the outer and inner regions of Ras-type cheese made by various salting methods. *Food Chemistry* 28(1); 1988; 1-16

Ras-type cheese was manufactured using different salting techniques and the cheeses manufactured were organoleptically examined. Proteolysis and lipolysis in the outer and inner layers of the same cheese were also assessed. Manufactured without salt addition to the curd and brining or brine/dry salting produced good quality cheese and accelerates proteolysis and lipolysis to a degree dependent on ripening temp. High ripening temp. enhanced the development of cheese flavour and this was associated with a marked reduction in the ripening period. Storage of cheese at 15 C appears to be suitable for maturing good quality Ras-type cheese in 8 wk. UJSR

Shrikhand

- 2635 Varadaraj (MC) and Ranganathan (B). Growth and production of thermostable deoxyribonuclease by *Staphylococcus aureus* in shrikhand. *Journal of Food Science and Technology, India* 25(1); 1988; 23-27

The ability of *Staphylococcus aureus* strains to grow and produce thermostable deoxyribonuclease (TDNase) in shrikhand when used in combination with *Streptococcus lactis*, *Str. cremoris*, *Str. thermophilus* and *Str. lactis* subsp. *diacetylactis* was evaluated. Cultures of *S. aureus* when inoculated in milk at levels of 1×10^8 CFU/ml produced detectable levels of TD Nase. Growth and production of TD Nase by *S. aureus* was less in the presence of *Str. lactis*. AS

Whey

- 2636 Kaustinen (EM) and Bradley (RLJr). Acceptance of cream liqueurs made with whey protein concentrate. *Journal of Dairy Science* 70(12); 1987; 2493-2498

This investigation has been carried out to examine the stability and acceptance of cream liqueurs prepared with whey protein conc. For these studies 10-20 kg batches of cream liqueur were prepared and mixes were vat pasteurized at 68 C for 30 min and homogenized two times in a homogenizer and the mix was cooled over a counter current surface heat exchanger to reduce mix temp. to approx. 7 C samples of cream liqueur were placed in screw cap bottles for storage studies and for visual, viscosity and microbiological evaluations. After product standardisation the most stable cream liqueur formulation was evaluated by sensory analysis and compared with a commercial coffee flavoured product. The results showed no significant differences in sweetness, texture, smoothness and overall preference. The most stable experimental samples were found to be better than the commer-

cial product. NGKR

Yoghurts

- 2637 Guirguis (N), Hickey (MW) and Freeman (R). Some factors affecting nodulation in yoghurt. *Australian Journal of Dairy Technology* 42(3/4); 1987; 45-47

This study has been undertaken to examine nodulation in yoghurts made with whey protein conc. (WPC) and to consider some of the other factors like starter culture and agitation that might influence their presence. It is seen that by substituting WPC for skim milk powder to increase the total solids content in the yoghurt premix the level of nodulation increased directly with the WPC in the premix. It is also found that by using *L. bulgaricus* in yoghurt manufacture more nodules were produced than using *L. helveticus*. By applying high shear rate to the yoghurt coagulum after its manufacture to stimulate the pumping process in commercial practice the level of nodulation is reduced along with the yoghurt viscosity. NGKR

Milk proteins

Casein

- 2638 Chobert (J-M), Sitohy (MZ) and Whitaker (JR). Solubility and emulsifying properties of caseins modified enzymatically by *Staphylococcus aureus* V8 protease. *Journal of Agricultural and Food Chemistry* 36(1); 1988; 220-224

Casein was treated with *Staphylococcus aureus* V8 protease to give 2 and 6.7% hydrolysis of the peptide bonds. *S. aureus* V8 protease has specificity only for peptide bonds in which glutamic acid contributes the carbonyl groups. After 2% hydrolysis, 70% of the resulting peptides had mol. wt. below 12400 as determined by size-exclusion chromatography. After 6.7% hydrolysis, 90% of the peptides had mol. wt. below 12400. The solubility of the hydrolysates was much higher than that of casein at pH 4.0-5.0 (0, 25 and 50% for control casein, 2% hydrolysate, and 6.7% hydrolysate, resp.). The emulsifying activity of the hydrolysates was reduced over that of casein at all pHs. AS

- 2639 Mohanty (B), Mulvihill (DM) and Fox (PF). Emulsifying and foaming properties of acidic caseins and sodium caseinate. *Food Chemistry* 28(1); 1988; 17-30

The emulsifying capacity of casein was dependent on pH, decreasing from 325 to 264 g oil/protein as pH increased from 1.5 to 3.5 and increasing from 251 to 268 g oils/g protein between pH 5.5 and 7.0; above pH 7.0 emulsifying capacity increased sharply to ~700 g oil/g protein at pH 8.5. The emulsifying capacity of sodium caseinate increased on addition of NaCl, up to 1 M, or CaCl up to 20mM, while the emulsifying capacity of acidic casein (pH 2.5) increased on addition of NaCl, up to 5mM, or CaCl up to 5mM and thereafter decreased on further addition of either. The creaming stability of emulsions pre-

pared in acidic casein increased as the pH increased from 2.0 to 3.0. Foaming capacities of caseins were in the order, acidic casein pH 2.5 > acidic casein pH 2.0 > sodium caseinate pH 7.0 > acidic casein 3.0, while foam stabilities were in the opposite order. Addition of NaCl, up to 20mM, or CaCl up to 10mM, decreased foam capacity of acidic casein (pH 2.0) but increased foam stability. AS

- 2640 Mottar (J), Baert (J), Waws (Gvan) and Cauwelaert (FH). Influence of the addition of whey proteins and of an ultrasonic treatment on the appearance of an acid casein gel after heating. *Netherlands Milk and Dairy Journal* 41(3); 1987; 207-214

In this investigation more information was sought into the phenomena occurring during the heating of the broken acid casein gel. The casein particles are found to react in different ways and the appearance of the heat treated soured milk can vary from smooth to course and these differences are attributed to hydrophobic interactions. By addition of undenaturated whey proteins or an ultrasonic treatment resulted in an increased protein hydrophobicity and favoured the formation of a smooth texture after a heat treatment of the fermented milk. NGKR

- 2641 Singh (H) and Fox (PF). Heat stability of milk. Influence of colloidal and soluble salts and protein modification on the pH-dependent dissociation of micellar K-casein. *Journal of Dairy Research* 54(4); 1987; 523-534

Reducing the colloidal calcium phosphate (CCP) content of milk by 40% or increasing it by 20% did not significantly affect the heat-induced pH-dependent dissociation of micellar K-casein. However, changes in soluble Ca and phosphate affected the dissociation of K-casein markedly; decreasing the phosphate concn. or increasing the Ca concn. reduced the formation of non-sedimentable N (NSN) and non-sedimentable 12% TCA-insoluble N-acetylneuraminic acid (NANA). Dialysis of milk against water for short periods (-5h) reduced the formation of both NSN and non-sedimentable 12% TCA-insoluble NANA, as did NaCl at concn. above 0.05 M. Modification of protein amino groups by succinylation promoted the release of K-casein while amidation of carboxyl groups had the opposite effect. It appears that the pH-dependent dissociation of K-casein produced on heating milk above 90 C is controlled by electrostatic interactions. The effects of soluble ions such as Ca^{2+} or Na^{+} appear to be due to shielding of such negatively-charged groups as seryl phosphate and carboxyl on the protein, thus reducing the release of K-casein. AS

MEAT AND POULTRY

Meat

- 2642 Bell (RG) and De Lacy (KM). The efficacy of nisin, sorbic acid and monolaurin as preservatives in pasteurized cured meat products. *Food Microbiology* 4(4); 1987; 277-283

Nisin, sorbic acid and two proprietary monolaurin products, Lauricidin R and Lauribic II, were studied. Detn. were made of their abilities to prevent *Bacillus licheniformis* growth in a model product of the cooked luncheon meat type. This product was made from a 3 : 1 mixture of lean beef and beef fat and contained 2.5% salt, 0.3% sodium tripolyphosphate and 200 p.p.m. sodium nitrite. Various concn. of the test preservatives were added to batches of the raw meat emulsion inoculated with 2×10^{-4} *B. licheniformis* spores g^{-1} before addition of various concn. of the test preservatives. Emulsions were cooked to a pasteurization values of 36 (reference temp. 70 °C), chilled overnight and then stored at 25 °C. The min. concn. of the test preservatives necessary to prevent product spoilage occurring within 10 days during abusive storage were; nisin 500 international units g^{-1} , sorbic acid 0.125%, Lauricidin 0.5% and Lauribic 0.25%. These concn. were also effective in controlling the growth of the natural enterococcus spoilage microflora of this mildly cooked product. AS

- 2643 Maggi (E), Bracchi (PG) and Nardelli (S). The PSE condition-III. Meat utilization as foodstuffs, directly and after processing. *Industrie Alimentari* 254(26); 1987; 1012-1016 (It).

A survey of technological methods to process PSE meats into raw materials, sausage products, salted and matured products is given; various factors that influence the processing of PSE meat are also discussed. BV

- 2644 Mikami (M), Whiting (AH), Taylor (MAJ), Maciewicz (RA) and Etherington (DJ). Degradation of myofibrils from rabbit, chicken and beef by cathepsin L and lysosomal lysates. *Meat Science* 21(2); 1987; 81-97

The degradation of rabbit, chicken and beef myofibrils by cathepsin L or lysosomal lysates was studied by SDS-polyacrylamide-gel electrophoresis and electron microscopy (EM). Similar degradation patterns were observed for each myofibrillar preparation incubated with cathepsin L, except that myosin heavy chain and tropomyosin of beef were more susceptible than those of rabbit and chicken. Otherwise, troponin T, troponin I and C-protein were rapidly degraded with slower degradation of titin, nebulin, myosin, heavy chain, x-actinin, x-tropomyosin, actin and myosin light chains, LC1 and LC2. However, the component of 30 000 Mr was found to be further degraded to smaller peptides. Degradation at pH 5.5 (approx. post-mortem limit value) was faster than at pH 6.0 but slower than at pH 5.0. A number of new protein bands were identified (130 000, 120 000, 90 000, 85 000, 80 000, 31 000, and 30 000 Mr). The degradation patterns of rabbit myofibrils by rabbit muscle lysosomal lysates were similar to that of myofibrils incubated with purified cathepsin L except for the retention of the 30 000 Mr component and reduced degradation of actin, due presumably to the reduced amount or stability of cathepsin L in the crude enzyme preparations. Electron micrographs revealed that myofibrillar degradation by cathepsin L occurred preferentially at the Z-lines leading to removal of the Z-line proteins & fracturing of the myofibrils at these sites. Catheptic damage was seen to be most rapid in chicken myofibrils and least rapid in beef myofibrils consistent with the more

rapid conditioning process in chicken. AS

Beef

- 2645 Dixon (ZR), Vanderzant (C), Acuff (GR), Savell (JW) and Jones (DK). Effect of acid treatment of beef strip loin steaks on microbiological and sensory characteristics. *International Journal of Food Microbiology* 5(2); 1987; 181-186

Surfaces of beef steaks were sprayed with 1% lactic acid, 1% acetic acid or a mixture of 1% lactic acid, 2% acetic acid, 0.25% citric acid and 0.17 ascorbic acid. They were then displayed in either polyvinyl chloride (PVC) film for 0-6 days or in high-oxygen barrier (HOB) film of 0-28 days. In most comparisons, aerobic plate counts, pH and scores for lean colour, surface discolouration, fat colour, overall appearance and off-odour of treated steaks were not consistently different ($P > 0.05$) from those of control steaks. AS

- 2646 Hawrysh (ZJ), Shand (PJ), Wolfe (FH) and Price (MA). Studies of extra low voltage electrical stimulation of mature beef carcasses. *Meat Science* 21(1); 1987; 121-135

The quality characteristics of biceps femoris (BF) and semimembranosus (SM) roasts obtained from mature cow carcasses treated with a commercial extra low voltage (30 V) electrical stimulation (LVES) system were determined. LVES was applied for either 2 (ESII) or 4 min (ESIII). Evaluations were conducted on meat obtained from control sides (no ES) aged for either 48 h (1a) or 7 days (1b) and from ES sides aged 48 h. ES caused a reduction ($P < 0.001$) in pH values at 2 and 6 h post mortem. At 24 h the pH of muscles from all carcasses was about 5.5. ES duration did not influence muscle pH. Rib-eye muscle colour for ESII and ESIII carcasses was lighter and brighter ($P < 0.05$) than that of control carcasses. Generally stimulated BF roasts had greater cooking losses than control group 1b roasts; SM roasts from ES duration had no effect on per cent cooking losses. Trained panelists generally detected few significant effects in BF roasts due to ES. Warner-Bratzler data indicated that ESII and ESIII BF roasts were similar and significantly more tender than comparable control group 1b samples; OTMS data indicated that all BF roasts were similar in tenderness. However, SM roasts from ES carcasses were judged more soft (groups II and III) and tender (ESII) than comparable control roasts. Instrumental measurements of tenderness for SM roasts tended to support the taste panel results. Generally, duration of LVES had no effect on the eating quality of either BF or SM roasts. Since LVES effects on the palatability of SM roasts were evident but the effects of stimulation of BF roasts were few, further studies of this LVES system are needed before its use can be recommended. Generally, increasing post-mortem aging time for mature control carcasses did not influence either BF or SM roast quality. AS

- 2647 Nassos (PS), Douglas King (AJr) and Stafford (AE). Lactic acid concentration as an indicator of acceptability in refrigerated freeze thawed ground beef. *Applied and Environmental Microbiology* 54(3);

1988; 822-823

Bovines

- 2648 Bhattacharyya (A), Mukhopadhyay (M) and Chaudhuri (DR). Discrimination of animal meats by enzyme assay. *Journal of Food Science and Technology, India* 25(1); 1988; 51-52

Fresh meat samples from the caprine group can be discriminated from those of the bovine group by assaying Mg ++ ATPase and peroxidase, the activities of which are significantly higher in the latter group. The individual species of the bovine group can be identified by phosphatase and catalase activities while those of the caprine group can be identified by succinic dehydrogenase and alkaline phosphatase activities. AS

Meat proteins

- 2649 Smith (DM). Meat proteins. Functional properties in comminuted meat products. *Food Technology* 42(4); 1988; 116-121

This article discusses the functional properties of importance during the production of comminuted meat products; similar functional properties are required for the manufacture of restructured products. The article begins with a discussion of the relationship between protein structure and functional properties, then identifies limitations of model system tests. Thereafter, the focus of the article is on functional properties of raw meat batters and cooked comminuted meat products. The effect of frozen storage, aging and muscle type on gel strength is also covered. GAR

- 2650 Whiting (RC). Ingredients and processing factors that control muscle protein functionality. *Food Technology* 42(4); 1988; 104-114

Retaining water-binding, fat binding and gelation abilities of myofibrillar proteins is essential for achieving the desired textural properties of meat products. This article focuses on protein role in meat product texture and the steps a processor can use to achieve the optimum functionality necessary for a particular product. Accepted practices as well as recent research has been discussed. GAR

Poultry

- 2651 Sooltan (JRA), Mead (GC) and Norris (AP). Incidence and growth potential of *Bacillus cereus* in poultry meat products. *Food Microbiology* 4(4); 1987; 347-351

Growth of *Bacillus cereus* in cooked chicken breast and leg meat was studied at 10, 15, 22 and 37 C. Mean generation times for four strains varied from 0.4 to 0.5 h at 37 C for 1.1 to 1.5 h at 22 C and from 2.6 to 4.1 h at 15 C. At 15 C two of the strains multiplied faster in leg than in breast meat. Little or no growth occurred at 10 C within five days. Of the 102 retail samples of poultry meat examined only 6.9% of samples contained detectable levels of B.

cereus, with counts ranging from $\log_{10}$ 1.4 to 3.5 g^{-1} , but large numbers of other organisms, up to $\log_{10}$ 7.7, were sometimes observed on the plates and may have masked the presence of *B. cereus* or inhibited growth. The latter possibility was confirmed in an experiment involving three selective media, three standard strains of *B. cereus* and the contaminating microflora of a chicken product. On each of the media, recovery of *B. cereus* was adversely affected by equivalent numbers of the other organisms. BV

Chickens

- 2652 Miteva (E) and Bakalivanova (T). Changes in the fatty acid composition of dietetic ready-to-cook chicken meat products during frozen storage. *Nahrung* 31(10); 1987; 981-986

The effect of frozen storage on the fatty acid composition of dietetic ready-to-cook chicken meat products of boneless chicken legs or breasts prepared by curing using several curing mixtures during frozen storage was studied. The ready-to-cook products are rich in unsaturated fatty acids which is predetermined by the high contents of mono-, di-, and polyene acids. The level of unsaturated fatty acids in the lipids of leg meat is higher than that in breast meat. During frozen storage of dietetic ready-to-cook products, no significant changes were noticed in their fatty acid compositions. The dietetic salt conc. used do not exert any substantial effects on the changes in the relative shares of saturated and unsaturated fatty acids. The fastest changes occur in the levels of linolenic, linoleic and palmitoleic acids, but the unsaturated to saturated fatty acids ratio remains greater than in all cases and in both types of meat till the end of storage. The application of citrate in the curing mixture had a favourable effect on the changes in that a min. alteration in the contents of unsaturated fatty acids was achieved. BV

- 2653 Norred (WP), Porter (JK), Dorner (JW) and Coli (RJ). Occurrence of the mycotoxin cyclopiazonic acid in meat after oral administration to chickens. *Journal of Agricultural and Food Chemistry* 36(1); 1988; 113-116

Four-week old chickens were administered 0.5, 5.0, or 10.0 mg of cyclopiazonic acid (CPA)/kg of body wt. by crop intubation and were killed 3, 24, 48, or 96 h later. Breast and thigh muscle was removed from the carcasses, and the content of CPA in the meat was measured by a high-performance liquid chromatographic procedure. CPA was found in the meat from birds in each dose group, and the amount found was dependent on both dose given and the elapsed time after dosing. The max. muscle content of CPA occurred 3 h after administration and ranged from 50 p.p.b. in birds given 0.5 mg/kg to over 5000 p.p.b. in some birds given 10.0 mg/kg. Birds given the highest dose of CPA eliminated CPA from meat at a lower rate than other treatment groups. AS

- 2654 Young (H), Youngs (A) and Light (N). The effects of packaging on the growth of naturally occurring microflora in cooked, chilled foods used in the catering industry. *Food Microbiology* 4(4); 1987; 317-327

The growth of microflora in fried chicken drumsticks and chicken a la king, of catering industry at 0 and 4 °C was investigated with respect to the effectiveness of vacuum packaging and modified atm. packaging in control being the microbial growth. Study was also conducted of two representative species of the naturally occurring microflora of these food items by means of direct inoculation. Both vacuum packaging and modified atm. packaging, when used at storage temp. of 0 plus or minus 1 and 4 plus or minus 1 °C, inhibit bacterial growth in cooked chicken menu items to levels below $5.00 \log_{10}$ g for 2 to 17 days. The direct inoculation studies indicated that the degree of this effect was dependent on the growth characteristics of the initial microflora. These methods ensure high product quality microbiologically over short periods of chilled storage (up to 5 days). These results have importance in the catering industry with respect to the use of cooked, chilled foods. BV

Spent hens

- 2655 Kondaiah (N) and Ponda (B). Effect of live weight, dressed weight and age on the yields of carcass components from spent hens. *Indian Journal of Animal Sciences* 58(2); 1988; 246-252

Carcass components data were collected on 251 white Leghorn spent hens and analysed to find the effect of live wt. groups (light < 1,400g; medium, 1,401-1,700 g; heavy, > 1,700 g), dressed wt. groups (light, < 1,000 g; medium, 1001-1,200 g; heavy > 1,200 g) and age groups (G 1, 450-500 days; G 2, 501-600 days; G 4, 601-650 days). Light type hens yielded higher per cent deboned meat and lower per cent fat compared to heavy type hens resulting in a higher deboned meat: fat ratio in light type hens. Hens of age group 1 had relatively higher meat: bone ratio and lean content. In spent hens of group 4 deposition of fat decreased and leg meat per cent increased. Live wt. and dressed wt. had higher correlations with many other components and could be used to predict the spent hen components. AS

SEAFOODS

Fish

- 2656 Ghadi (SV) and Ninjoor (V). The binding strength of fish muscle rolls. *Journal of Food Science and Technology, India* 25(1); 1988; 28-30

Six var. of low priced fish in the form of cooked fish muscle rolls were examined for their binding strength. The binding capacity was ascertained in terms of tensile and breaking strength, water holding capacity, cooking loss and sensory evaluation. The parameters were found to correlate closely with each other in determining the texture of the cooked minced muscle rolls. Addition of NaCl and sodium tripolyphosphate (NaTPP) improved the binding properties. Among the fish var. examined, shark and catfish muscle rolls yielded max. binding strength. AS

Carp

- 2657 Uchida (N), Musashi (T), Katuura (H), Anzai (H) and Nishide (E). Uptake and fate of P, P'-DDT in carp and tilapia. *Bulletin of the Japanese Society of Scientific Fisheries* ('Nihon Suisan Gakkai-shi') 54(1); 1988; 129-133

Uptake of fate of P-P'-DDT (DDT) in carp *Cyprinus carpio* and tilapia *Oreochromis niloticus* were investigated by exposure to approx. 0.4 ng/ml of DDT solution for 10 wk in the flow-through aquarium and by the detn. of DDT, P, P'-DDE (DDE), P, P'-DDD (DDD) and P, P'-DDT-OH (DDT-OH) in the whole bodies with GC-FID. The concn. of DDT in carp gradually increased with the exposure time, while that of DDE rapidly increased, but DDD and DDT-OH were not detectable. The bioconcentration factor (BCF) of DDT in carp at 10 wk exposure was about 5,000, on the other hand, that of DDT + DDE was about 22, 000. In tilapia, DDT concn. rapidly increased with exposure time, but no DDT metabolites were detected except a very small amount of DDD through the experiment. The BCF of DDT in tilapia at 10-wk was about 23,000 roughly corresponding to that of DDT + DDE in carp. These results suggest that carp and tilapia show no difference in the uptake of DDT, but a significant difference of fate in their whole bodies. AS

Cod

- 2658 Surette (ME), Gill (TA) and LeBlanc (PJ). Biochemical basis of post-mortem nucleotide catabolism in cod (*Gadus morhua*) and its relationship to spoilage. *Journal of Agricultural and Food Chemistry* 36(1); 1988; 19-22

The enzymatic changes involved in the postmortem break down of nucleotides in cod and in particular, the properties of nucleoside phosphorylase and inosine nucleosidase with regard to spoilage have been studied. MVG

Crayfish

- 2659 Inoue (T), Simpson (KL), Tanaka (YS) and Sameshima (M). Condensed astaxanthin of pigmented oil from crayfish carapace and its feeding experiment. *Bulletin of the Japanese Society of Scientific Fisheries* ('Nihon Suisan Gakkai-shi') 54(1); 1988; 103-106

The pigments were extracted from crayfish carapace with soy oil. Astaxanthin and its esters were purified concentrated by using micro-crystalline cellulose adsorption chromatography. The concn. of the purified pigments was about forty times that of the original pigmented oil. The separation of the pigments from the pigmented soy oil affected reducing the amount of oil necessary to fortify the diet. Rainbow trout *Salmon gairdineri* fed with the diets containing the purified pigments were found to have the desirable pink colouration. The analysis of the pigment in the test diets and fish flesh was carried out. The diets with higher level of oil had higher pigment decomposition. SGB

Hake

- 2660 Seidlre (T). Effects of additives and thermal treatment on the content of nitrogen compounds and the nutritive value of the hake meat. *Nahrung* 31(10); 1987; 959-970

Heating of minced meat from 40 to 130 C for 10 min and at 120 C from 15 to 60 min with potato starch (3%), soy bean oil (4%), salt (1.5%) and water (15%) resulted in a decrease in total amino acid content by 6% on the av., compared to the content in meat without additives. Heating time-dependent changes involved a decrease in the lysine content, while temp. dependent changes involved a decrease in the valine content. On the other hand, the presence of additives reduced thermal protein hydrolysis towards the formation of low-mol. N compounds. Prolonged time of heating of minced hake meat at 120 C produced a more intensive protein hydrolysis than a shorter heating up to 130 C; at the same time with temp. exceeding 100 C an intensive increase in the ammonia content, decrease in-SH groups content, and a decrease in protein digestibility were observed. AS

Sardines

- 2661 Nakayama (T), Kashiwagi (Y), Kanoh (S) and Niwa (E). Manufacturing of sardine terrine by addition of carrageenan. *Bulletin of the Japanese Society of Scientific Fisheries* ('Nihon Suisan Gakkai-shi') 54(1); 1988; 123-128

Sardine terrine was produced from minced sardine and carrageenan. The addition of K-carrageenan increased jelly strength markedly and breaking deformation slightly; K-carrageenan added in excess decreased breaking deformation of product from dressed sardine. The addition of Lambda-carrageenan increased jelly strength moderately, but did not change breaking deformation. The sensory evaluation corresponded to the instrumental evaluation of jelly strength. Panelists favoured the products with K-carrageenan and Lambda-carrageenan in the products both from round and dressed fish. Among them, the product from dressed fish with 6% K-carrageenan was favoured most. All sardine terrines were juicy, having moisture content of about 65%. The gelation of minced sardine with K-or Lambda-carrageenan proceeded at the temp. below 80 C. The addition of Lambda carrageenan to minced sardine did not induce gelation, due to the lowering of temp. The properties of K-, T and Lambda-carrageenans were revealed more vividly in minced from dressed sardine compared to that from round fish. SGB

Skipjack tuna

- 2662 Tagawa (S), Matsuura (A), Hanaoka (K) and Kaise (T). Isolation and identification of arsenobetaine from concentrated extracts of skipjack tuna *Euthynnus pelammis* and albacore *Thunnus alalunga*. *Bulletin of the Japanese Society of Scientific Fisheries* ('Nihon Suisan Gakkai-shi') 54(1); 1988; 113-116 (Ja).

The water-soluble arsenic compound was isolated from a concn. extract of skipjack tuna (so-called "katsuo-senji" in Japanese) which

was prepared from cooker drain of "katsuo-fushi" preparation, and that of albacore prepared from steaming drain of tuna canning. The specimens were extracted with a chloroform-methanol mixture, and the arsenic compounds were isolated from the methanol phases by successive chromatographies on active carbon, Dowex 50W-X 8 (H form), Dowex 1-X8 (OH -form), Sephadex G-25F, Dowex 50W-X 2 (pyridinium form), and finally preparative thin layer of cellulose. Both isolated compounds were identified to be arsenobetaine by comparison of TLC behaviour, IR and FAB mass spectra with those of synthetic arsenobetaine. AS

Fish products

Sausages

- 2663 Satomi (K), Sasaki (A) and Yokoyama (M). Effect of chelating agents and antioxidants on the lipid oxidation in fish sausage. *Bulletin of the Japanese Society of Scientific Fisheries* ('Nihon Suisan Gakkai-shi') 54(1); 1988; 107-112 (Ja).

Sodium polyphosphate, EDTA-2Na, BHT and sodium ascorbate were evaluated for their antioxidative activity in fish sausage in presence and absence of added sodium nitrite. The sausage were stored at 37 °C in darkness and the surface portion of the sausages were sampled for analysis. Sodium polyphosphate and EDTA-2Na suppressed increase in TBA value to some degree, but did not inhibit development of oxidised odour. BHT was found more effective in suppressing TBA value compared to the chelating agents, but did not inhibit the development of oxidised odour. These findings indicate that the oxidised product that cannot be estimated by TBA value, contribute to the development of off-flavour of the sausage. Sodium ascorbate inhibited both the increase in TBA value and the development of oxidised odour. Among the four additives examined, sodium ascorbate was most effective, especially when sodium nitrite coexisted. The findings of the experiments showed that the addition of sodium ascorbate favoured the formation of nitrosopigment in the sausage during cooking process and that there was a greater correlation between nitrosopigment content and flour score of the sausage, indicating the important role of nitrosopigment in the inhibition of oxidative deterioration of the flavour of the sausage. SGB

Scallops

- 2664 Nelson (DA), Miller (JE) and Calabrese (A). Effect of heavy metals on bay scallops, surf clams, and blue mussels in acute and long term exposures. *Archives of Environmental Contamination and Toxicology* 17(5); 1987; 595-600

Juvenile *Argopecten irradians* and *Spisula solidissima* were exposed to Cu, Pb, Se or Zn in a 96 h static bioassay. The order of toxicity for both the sp. was Cu > Se > Zn > Pb. Juvenile *Mytilus edulis* were exposed in 96 h static bioassay to Cd, Cu, Hg, or Ag. The order of toxicity was Cu = Hg = Ag > Cd. KMA

Shrimps

- 2665 Kubota (K) and Kobayash (A). Identification of unknown methyl ketones in volatile flavour components from cooked small shrimp. *Journal of Agricultural and Food Chemistry* 36(1); 1988; 121-123

Two novel ketones in the aroma concn. from cooked small shrimp, *Euphausia pacifica* Hansen, were isolated. They had a sea-food like aroma. Their structures were estimated by spectroscopic IR, NMR, and MS analyses and were confirmed as (5Z, 8Z, 11Z)-and (5E, 8Z, 11Z)-5, 8, 11-tetradecatrien-2-one by referring to the spectroscopic data to synthesised all-Z and all-E isomers. These two ketones were also found in the aroma concn. from two other kinds of cooked small shrimps, *Euphausia superba* Dana and *Sergia lucens* Hansen. The partial structure of natural fatty acids was retained in the mol. and no other geometrical isomer was found in the three kinds of cooked shrimps; therefore, we concluded that the stereostructures of these compounds were formed in living shrimps. AS

Squids

- 2666 Seidler (T) and Bronowski (M). Effects of storage time and thermal treatment on the nutritive value of squid (*Illex argentinus*). *Nahrung* 31(10); 1987; 949-957

The storage (-28 C) of squids prior to thermal treatment (steaming at 100 C and autoclaving at 115 C) was found to exert no significant influence on the available lysine and tryptophan contents of the flesh stored for no longer than 9-10 months. During a longer period of storage the contents of the studied amino acids decreased by 22.2% on an av. The SH-groups content and wt. losses after thermal treatment were increasing with the time of frozen storage. The colour of squid flesh, as measured with a and b indicators (LAB system), changed most in the autoclaved samples, the colour changing towards yellow-red. AS

PROTEIN FOODS

Infant foods

- 2667 Malleshi (NG) and Desikachar (HSR). Reducing the paste viscosity (dietary bulk) of roller dried weaning foods using malt flour or fungal amylase. *Journal of Food Science and Technology, India* 25(1); 1988; 1-3

An effort were made to develop a simple method for reducing the paste viscosity of roller dried weaning foods using permitted starch hydrolysing adjuncts such as malt flour or fungal Alpha-amylase and to understand the effect of added malt on the sensory and protein qualities of the weaning food on storage. Barley malt flour (2.5%) or fungal alpha-amylase (0.15%) added to a proprietary brand of roller dried weaning food reduced the paste viscosity of its 20% slurry from

15,000 to 1000 cp. The protein efficiency ratio and the sensory quality of weaning food containing malt were not adversely affected by storage. MVG

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Alcoholic beverages

Beer

- 2668 Garcia-Sanchez (F), Carnero (C) and Heredia (A). Fluorometric determination of P-coumaric acid in beer. *Journal of Agricultural and Food Chemistry* 36(1); 1988; 80-82

A new spectrofluorometric method to determine P-coumaric acid in beer has been developed. After the pH of the samples was adjusted to 2, impurities were extracted into hexane. Phenolics were then extracted into ethyl acetate, dried and redissolved in water. Aliquots of solutions were adjusted to pH 10.7 and the fluorescence intensities were measured at $\text{Lambda}/ = 330\text{nm}$ and $\text{sub exc}/ = 435\text{ nm}$. Recovery data, detection limits, and also the corresponding analyses by standard addition method of endogenous P-coumaric acid in commercial beer are reported. AS

Non-alcoholic beverages

Coffee

- 2669 Stavric (B), Klassen (R), Watkinson (B), Karpinski (K), Stapley (R) and Fried (P). Variability in caffeine consumption from coffee and tea. Possible significance for epidemiological studies. *Food and Chemical Toxicology* 26(2); 1988; 111-118

Caffeine

- 2670 Gluck (M) and Lingens (F). Heteroxanthinedemethylase, a new enzyme in the degradation of caffeine by *Pseudomonas putida*. *Applied Microbiology and Biotechnology* 28(1); 1988; 59-62

In *Pseudomonas putida* a new enzyme has been detected, which converts heteroxanthine into xanthine by oxidative demethylation. Evidence is presented that this heteroxanthinedemethylase is not responsible for the demethylation of caffeine, supporting the hypothesis that specific enzymes catalyze caffeine demethylation in *Pseudomonas putida*. AS

Fruit juices

- 2671 Di Cesare (LF), Polesello (A), Nani (R) and Rizzolo (A). Utilization of apolar sorbents for the recovery of fruit juices aroma. Part 6. Evaluation of the efficiency of a KS112 apolar resin for the recovery from model mixtures. *Flussiges Obst* 55(6); 1988; 324-326(310-311)

(De).

- 2672 Dukel (F). Standard for Brix values and acid degrees of fruit juices and fruit pulp. *Flussiges Obst* 55(6); 1988; 331-332(312-313)
- 2673 Kuneman (DW), Braddock (JK) and McChesney (LL). HPLC profile of amino acids in fruit juices as their (1-fluoro-2,4-dinitrophenyl)-5-L-alanine amide derivatives. *Journal of Agricultural and Food Chemistry* 36(1); 1988; 6-9

Apple juices

- 2674 Hartog (JB). A study of the international supply and demand for apple juice and apple juice concentrate. *Flussiges Obst* 55(6); 1988; 296-302 (De).

Blackberry juices

- 2675 Georgilopoulos (DN) and Gallois (AN). Flavour compounds of a commercial concentrate blackberry juice. *Food Chemistry* 28(2); 1988; 141-148

The volatile compounds of commercial blackberry juice were isolated by a simultaneous distillation-extraction procedure. Seventy compounds were identified by GC-MS (EI and CI mode), GC-IR analysis and comparison of retention indices with those of authentic compounds. The aroma of this juice is mainly due to the presence of furfural (which represents a third of the total odorous profile), 3-methylbutanal, 3-methyl-1-butanol, phenylacetaldehyde and trans-furan linalool oxide. AS

Citrus juices

- 2676 Handwerk (RL) and Coleman (RL). Approaches to the citrus browning problem. A review. *Journal of Agricultural and Food Chemistry* 36(1); 1988; 231-236

The studies on compositional changes that relate to taste change in orange juice and juice simulation models have been reviewed. The conclusion is that adverse flavour changes associated with browning result from formation of compounds that impart objectionable flavour at low concn. MVG

- 2677 Ram (BP), Jang (L), Martins (L) and Singh (P). An improved enzyme immunoassay for limonin. *Journal of Food Science* 53(1); 1988; 311-312

Performance of the previously reported enzyme immunoassay for determination of limonin in citrus juice was improved by stabilization of anti-limonin-antibody-coated microtitration wells with 1% solution of ovalbumin and polyvinyl alcohol. Standard curves of the antibody stabilized wells showed insignificant change upon storage at 4 C for 5 months. Average inter- and assay coeff. of variation were 6.5% and 3.5% resp. assuring consistent assay performance. AS

Grape juices

- 2678 Cheynier (VF) and Van Hulst (MWJ). Oxidation of trans-caftaric acid and 2-S-glutathionylcaftaric acid in model solutions. *Journal of Agricultural and Food Chemistry* 36(1); 1988; 10-15

This work is intended to specify the respective roles played by caftaric acid, glutathione and 2-S-glutathionylcaftaric acid in grape juice enzymatic oxidation by using HPLC and polarographic methods. MVG

- 2679 Zouari (N), Romette (J-L) and Thomas (D). Continuous-flow estimation of lacase activity in rotten grape juice by a computerized electrode. *Journal of Chemical Technology and Biotechnology* 40(3); 1987; 195-201

A continuous-flow method for estimation of the degree of rot in grape has been developed which involves measuring the oxygen consumption in a mixture consisting of grape juice and quinol. For the automation of the system, assay were carried out with centrifuged and heated samples of grape juices. The feasibility of the system has been demonstrated. AS

FATS AND OILS

Fats

- 2680 Buckenhuskes (H), Rein (U) and Gierschner (K). Influence of a new type of fryer on the quality of frying fat. *FAT Science and Technology* 90(4); 1988; 143-147 (De).

Oils

- 2681 Coors (U) and Montag (A). Stability of tocopherols in vegetable oils. *FAT Science and Technology* 90(4); 1988; 129-136 (De).

Tocopherols in crude vegetable oils are partially destroyed by technological treatments. A further decomposition during storage is possible by influence of light, oxygen and temp. The influence of these parameters on total tocopherol content and tocopherol distribution was studied in several refined and cold pressed oils during a 12 wk storage time. The tocopherols showed good stability at low temp. (4 °C). When kept at room temp. (20-35 °C), an additional effect of light was of greater influence (higher decrease of the content) than the additional effect of an oxygen. The stability at low temp. was found to be Alpha-T > Gamma T, at room temp. Gamma-T > Alpha-T. AS

- 2682 Eisser (RL) and Friedrich (JP). Estimation of supercritical fluid-liquid solubility parameter differences for vegetable oils and other liquids from data taken with a stirred autoclave. *Journal of the American Oil Chemists' Society* 65(5); 1988; 764-767

- 2683 El-Rafey (HHA), Peredi (J), Kaffka (K), Naday (B) and Balogh (A). Possibilities of application of NIR techniques in the analysis of oil seeds and their derivatives-examination of used frying oils. *FAT Science and Technology* 90(5); 1988; 175-179

Near infrared reflectance (NIR) techniques has been used to determine polymers and polar compounds in used frying oils. N

- 2684 Prasad (UV), Divakar (TE), Reddy (RVR) and Sastry (CSP). Spectrophotometric determination of DI-T-butylhydroquinone (TBHQ) in oils. *Journal of Food Science and Technology, India* 25(1); 1988; 42-43

Two simple spectrophotometric methods were developed for the detn. of DI-T-butylhydroquinone in commercial samples and oils based on the formation of coloured species with 4-aminophenazone-10 -or sodium nitroprusside-hydroxylamine under alkaline conditions. AS

Essential oils

- 2685 Deans (SG) and Ritchie (G). Antibacterial properties of plant essential oils. *International Journal of Food Microbiology* 5(2); 1987; 165-180

Fifty plant essential oils were examined for their antibacterial properties against 25 genera of bacteria. Four concn. of each oil were tested using an agar diffusion technique. The ten most inhibitory oils were thyme, cinnamon, bay, clove, almond (bitter), lovage, pimento, marjoram, angelica and nutmeg. The most comprehensively inhibitory extracts were angelica (against 25 genera), bay (24), cinnamon (23), clove (23), thyme (23), almond (bitter) (22), marjoram (22), pimento (22), geranium (21) and lovage (20). AS

Rice bran oils

- 2686 El-ssukkary (MM), El-Sawy (AA) and El-Dib (F). Synthetic detergents from crude rice bran oil. *Chemical Age of India* 39(2); 1988; 91-92

Safflower oils

- 2687 Rajadhyaksha (RA), Chaudari (DD) and Joshi (GW). Super acid catalyzed dimerization of fatty acids derived from safflower oil and dehydrated castor oil. *Journal of the American Oil Chemists' Society* 56(5); 1988; 793-797

Soybean oils

- 2688 Proctor (A) and Snyder (HE). Adsorption of lutein from soybean oil on silicic acid. II. kinetics *Journal of the American Oil Chemists' Society* 65(5); 1988; 761-763

Adsorption kinetics of lutein on silicic acid from a crude soybean oil miscella were first order with respect to lutein at small pigment concn. but zero order above 15 μ M. Lutein adsorption was first order with respect to silica. Triglyceride adsorption was first

order with respect to triglyceride concn. and adsorbent dose. The adsorption rate constant of lutein was reduced by increasing the triglyceride concn. relative to that of lutein. Both lutein and triglyceride were reversibly bound. The kinetic data indicated competition between lutein and triglyceride for adsorption sites. AS

SPICES AND CONDIMENTS

Kokum

- 2689 Krishnamurthy (N) and Sampathu (SR). Antioxidant principles of kokum rind. *Journal of Food Science and Technology, India* 25(1); 1988; 44-45

The antioxidant principles of dried kokum (*Garcinia indica*) rind were soluble in hexane, ether, acetone, ethylacetate or ethanol. The hexane extract incorporated at 0.2% level in groundnut oil showed a peroxide value of 23 meq/kg oil as against 14 and 600 for TBHQ (0.02%) and control resp. after 164 h incubation. Garcinol, an yellow coloured fat -soluble pigment isolated from the hexane extract did not possess any antioxidant activity at 0.02% level. Iso-garcinol an isomer of garcinol showed weak activity. The hexane extract on fractionation with sodium hydroxide/sodium bicarbonate solutions or by column chromatography on silica gel or sephadex gave fractions with reduced activity. AS

SENSORY EVALUATION

- 2690 Kiss (I) and Farkas (J). Irradiation as a method for decontamination of spices. *Food Reviews International* 4(1); 1988; 77-92

Review covers decontamination of spices, traditional methods for reducing microbial contamination of spices (spice extracts), decontamination of spices by ionizing radiation, reduction of viable count by ionizing radiation, the sensory quality and chemical changes of irradiated spices, the economic feasibility of radiation treatment of spices, wholesomeness of irradiated spices, legislative status of radiation treatment of spices and commercialization of radiation treatment of spices. 80 references. BV

FOOD STORAGE

- 2691 Bindrich (U) and Tscheuschner (H-D). Oscillation rheometric investigations of constant shape foodstuff with viscoelastic properties. *Getreide, Mehl und Brot* 42(4); 1988; 104-107 (De).

A self-developed oscillation rheometer with 4 parallel plate system has been described. Its use and results of studies on wheat-bread crumb have been reported. It has been shown that the oscill-

ation rheometric measuring method is well united for characterising the important rheological properties of stable-shaped viscoelastic foodstuffs. Good correlations have been found between rheological properties and structure. The advantages of this method listed are: a) non-destructive measurement of the test-samples, b) possibility of structure analysis after measurement, c) use of the same samples for the whole cycle of measuring parameters, thus eliminating variations due to different samples, d) automatic long-time run of the measurements and e) small requirement (30 mm dia x 30 mm high) of the experimental material. SZA

INFESTATION CONTROL AND PESTICIDES

Infestation control

- 2692 Barclay (HJ). Models for pest control using sex pheromones and chemosterilants. *Insect Science and its Application* 8(2); 1987; 187-196

Twelve models are presented to examine the feasibility of using pheromone baited traps containing chemosterilant for pest control, and to compare the efficiency of this method with the use of (i) pheromone baited traps containing insecticide and (ii) sterile releases. It was found that the number of matings per individual has little effect on the efficiency of population control, whereas immigration of even a relatively small number of the pest species severely limits this method in its ability to control the population. The existence of density-dependent regulation on the other hand greatly enhances the effectiveness of this control method. If the birth rate greatly exceeds one young per adult per day, then the method using chemosterilants is approx. twice as efficient as either insecticides in the pheromone traps or the release of sterile males. However, if the birth rate is much less than one per day, as in tsetse, then chemosterilants are very much more efficient than either method. These differences in relative efficiency appear to depend on the frequency of mating relative to the birth and mortality rates. AS

- 2693 Ismail (II), El-Nahal (AKM), Kamel (AH) and Mostafa (TS). Effect of sublethal doses of gamma radiation of the fecundity, longevity and sterility of adults of *Sitotroga cerealella* (Olivier) (Lepidoptera, Gelechiidae). *Insect Science and its Application* 8(2); 1987; 177-179

Pesticides

Insecticides

- 2694 Olaifa (JI), Erhun (WO) and Akingbohunbe (AE). Insecticidal activity of some Nigerian plants. *Insect Science and its Application* 8(2); 1988; 221-224

The insecticidal activities of essential oils obtained from seven Nigerian indigenous plants is reported. Steam distillates of seven Nigerian plants, *Lippia adoensis* Hoschst, *Azadirachta indica*,

A. Juss, *Monodora tenuifolia* Benth, *Piper guineense* Schum & Thonn, *Petiveria alliacea* L.; *Citrus sinensis* L.; and *Cymbopogon citratus* L. were tested for acute toxicity of insect pests. BV

TOXICOLOGY

- 2695 Kanetoshi (A), Ogawa (H), Katsura (E) and Kaneshima (H). Disposition and excretion of Irgasan DP 300 and its chlorinated derivatives in mice. *Archives of Environmental Contamination and Toxicology* 17(5); 1988; 637-644

The distribution of radioactivity were examined by whole body autoradiography and liquid scintillation spectrophotometry in male mice following oral administration of tritium labelled Irgasan. The autoradiogram at 6 or 24 h showed that radioactivity distributed with gull, liver, lung, heart and kidneys. The radioactivity was most conc. with gull suggesting the enterohepatic circulation of these compounds. KMA

Amaranth

- 2696 Clode (SA), Hooson (J), Grant (D) and Butler (WH). Long-term toxicity study of amaranth in rats using animals exposed in utero. *Food and Chemical Toxicology* 25(12); 1987; 937-946

Groups of control and treated rats of each sex fed amaranth in their diet providing daily intakes of 0 (control), 50, 250 or 1250 mg/kg for 111 wk (male) and 112 wk (female). The rats had been exposed to the same dose levels in utero, and their parents were exposed for 60 days before mating. The colouring had no effects on fertility, haematological parameters, serum chemistry or incidence of tumours except the treated rats showed contamination of the fur and red colouring of the faces and at high dose levels faecal pellets were poorly formed. High dose also caused the production of more pups with these studies it was concluded that amaranth fed to rats at dose levels of up to 1250 mg/kg/day did not have any carcinogenic effect. However, it was not possible to establish a no-untoward effect level in the study because of the effect on the kidneys of female. MVG

- 2697 Phillips (JC), Bex (CS), Mendis (D), Walters (DG) and Gaunt (IF). Metabolic disposition of ¹⁴C-labelled amaranth in the rat, mouse and Guinea-pig. *Food and Chemical Toxicology* 25(12); 1987; 947-954

Results presented in this paper describe the absorption, distribution, excretion and metabolism of ¹⁴C-labelled amaranth in the rat, mouse and Guinea-pig following oral administration at dose levels 2 and 200 mg/kg body wt. MVG

Brown HT

- 2698 Mangham (BA), Moorhouse (SR), Grant (D), Brantom (PG) and Gaunt (IF). Three-generation toxicity study of rats ingesting Brown HT in the

diet. Food and Chemical Toxicology 25(12); 1987; 999-1007

Brown HT was fed to rats of both sexes over three generations at dietary concn. providing 0 (control), 50, 250 and 500 mg/kg body wt./day. The only findings that could be related to treatment were caecal enlargement, brown colouration of the lymph nodes and some areas of the gastro-intestinal tract, and indication of nephrotoxicity in the form of increased kidney wt. There was no evidence that any of these findings had any adverse effects on the animals. However, on the basis of the changes in the kidney wt., it was concluded that no-untoward effect level in this study was 250 mg Brown HT/kg/day. MVG

- 2699 Phillips (JC), Mendis (D) and Gaunt (IF). Metabolic disposition of ¹⁴C-labelled brown HT in the rat, mouse and Guinea-pig. Food and Chemical Toxicology 25(2); 1987; 1013-1019

The absorption, distribution and ¹⁴C-labelled Brown HT in the rat, mouse and Guinea pig following oral administration at low (50-70 mg/kg) and high (250 mg/kg) dose levels were studied. The rates of excretion and elimination of radioactivity from the tissues in rats given a single oral dose of ¹⁴C-labelled Brown HT following multiple oral dose of either ¹⁴C-labelled or unlabelled Brown HT were also investigated. The results suggested that despite the rapid reduction and elimination of the major part of an oral dose of Brown HT, some colouring and/or metabolites accumulate in most tissues of male rats during repeated daily administration, but that only in the kidney and mesenteric lymph nodes is the accumulation in tissue-specific. The accumulated radioactivity is cleared rapidly from most tissues on cessation of treatment. No significant absorption of either Brown HT, metabolites or subsidiary dyes was detected using loops of small intestine. MVG

Carmine

- 2700 Ford (GP), Goapl (D), Caunt (IF), Evans (JG) and Butler (WH). Chronic toxicity/carcinogenicity study of carmine of cochineal in the rat. Food and Chemical Toxicology 25(12); 1987; 897-902

Carmine was fed continuously to groups of 54 males and 54 females at dietary levels providing 50, 150 or 500 mg/kg body wt./day for up to 109 wk. As a control groups of 90 males and 90 females were fed the basal diet for the same period. The rats were derived from parents fed the same dietary levels for 60 days before mating and throughout pregnancy and were thus potentially exposed in utero. There were no adverse effects upon survival, growth or intakes of food and water. No changes associated with treatment were found during the periodic measurement of haematology or renal function, or in the serum chemistry or organ wt.s at the end of the study. Tumour incidence was not affected, and variations in the distribution of the non-tumour pathology were not considered to be due to treatment. It was concluded that carmine administered to rats in utero and for up to 109 wk is not carcinogenic and that the no-untoward effect level is 500 mg carmine/kg body wt./day. AS

- 2701 Grant (D) and Gaunt (IF). Three-generation reproduction study on carmine of cochineal in the rat. Food and Chemical Toxicology 25(12); 1987; 903-912

Carmine was fed continuously to male and female rats over three generations at dietary concn. that provided intakes of 50, 150 or 500 mg carmine/kg body wt./day. In adult animals of all generations there were no effects of treatment on body-wt. gain, food and water intakes or fertility. At autopsy, the wt. and the gross and microscopic appearance of the organs were normal. In the teratological investigations, examination of the foetal skeletons of the F3 generation reveals slightly more advanced stage of ossification in all treated groups compared to those of the control. Survival, growth and development of offspring in all treated groups compared were similar in each group apart from a slight delay in the time of tooth eruption in the 150- and 500 mg/kg groups of the first and second generations. This was not seen in the final generation. It is concluded that carmine had no untoward effects on the growth and fertility of adult rats, or on the ante- and postnatal development of their offspring when given continuously at doses of up to 500 mg/kg body wt./day in the diet throughout all phases of mating, gestation, lactation, weaning and adult life over three successive generations.

- 2702 Grant (D), Gaunt (IF) and Carpanini (EMB). Teratogenicity and embryotoxicity study of carmine of cochineal in the rat. Food and Chemical Toxicology 25(12); 1987; 913-917

Groups of 30 mated female rats were given daily doses of 0, 200, 500 or 1000 mg carmine/kg body wt. by oral intubation throughout pregnancy. A group of 17 similar animals was given a solution of chlorides to provide an intake of sodium, potassium and ammonium equal to that resulting from the highest dose level of carmine. There were no effects of carmine treatment on body wt. pregnancy rates, pre-implantation losses, the average numbers of live young, litter wt. or foetal wt. The group given the highest dose of carmine and the cation control had increased numbers of implantations and post-implantations losses. The latter was considered to be due to an inability to maintain the increased numbers of implantations rather than to an embryotoxic effect. The foetuses showed no malformations and those from the carmine-treated rats tended to have a slightly more advanced degree of ossification of certain skeletal elements than foetuses of the control animals. On the basis of the results obtained it is considered that there were no untoward effect on embryo development in rats given oral doses of up to 1000 mg carmine/kg body wt./day throughout pregnancy. AS

Carmoisine

- 2703 Ford (GP), Stevenson (BI) and Evans (JG). Long-term toxicity study of carmoisine in rats using animals exposed in utero. Food and Chemical Toxicology 25(12); 1987; 919-925

Groups of rats of both sex were fed diets providing 0 (control) 100, 400 or 1200 mg carmoisine/kg body for 9 wk. Within each group

the animals were mated homogamously and the young ones similarly treated for 110 wk for females or 115 wk for males. Apart from the colouration of the fur urine and faeces the treated rats did not differ in appearance or behaviour from the controls, and mortality was also not affected. High dose groups had reduced body-wt. gain despite slightly higher food intakes. Periodical haematological studies did not show any treatment-related changes. Similar analysis showed low glucose concn. in both sexes of and urine did not show any treatment-related changes. Serum analysis showed low glucose concn. in both sexes of the high dose groups and intermediate-dose females. A few high dose animals had bladder hyperplasia while some high dose females had increased incidence of bladder/fibric cysts or internal hyperplasia/medial hypertrophy of the pancreatic blood vessels. Tumours occurred with similar distribution and incidence in all groups except for an increased incidence of adrenal phaeochromocytoma in high dose males. It was concluded from the above results that carmoisine is not carcinogenic and that 400 mg carmoisine mg/kg/body wt./day had no untoward effect. MVG

- 2704 Phillips (JC), BexC), Walters (DG) and Gaunt (IF). Metabolic disposition of ^{14}C -labelled carmoisine in the rat, mouse and Guinea-pig. **Food and Chemical Toxicology** 25(12); 1987; 927-935

Metabolic fate of ^{14}C -labelled carmoisine at substantially lower dose levels (0.5 and 50 mg/kg) in the rat, mouse and Guinea pig, and the nature of the urinary and faecal metabolites of carmoisine in these species were studied. MVG

Green S

- 2705 Brantom (PG), Creasy (DM) and Gaunt (IF). Long term toxicity study of Green S in mice. **Food and Chemical Toxicology** 25(12); 1987; 977-983

Results of this study with mice exposed in uterus to Green S and recovering dietary levels of up to 0.66% for up to 2 yr indicated that there was no evidence of an adverse effect of treatment or of any carcinogenic effect. MVG

- 2706 Clode (SA), Gaunt (IF), Hendy (RJ), Cottrell (RC) and Gangolli (SD). Short-term toxicity study of Green S in rats. **Food and Chemical Toxicology** 25(12); 1987; 969-975

Groups of rats (15 of each sex) were fed Green S at dose levels of 0(control), 250, 500 or 1500 mg/kg/day for 13 wk. Addition at groups (5 of each sex) were similarly fed for 2 or 6 wks. Marked excretion of green colour was observed as well as some green colouring of the urine, which may be due to contamination. At highest dose levels the males showed increased water and food intakes with a higher rate of body wt. gain. Again, at highest dose level, haematological examination showed a transitory mild anaemia while there were no findings indicative of toxic effect in the renal concn. tests and serum analysis. At 1500 mg Green S/kg a greater proportion of rats showed higher urinary protein, protein casts, increased caecal wt. thyroid degeneration in the females and enlargement of the lymph nodes in the

intestinal wall. The no-effect dose level of Green S in this study was considered to be 500 mg/kg. MVG

- 2707 Moorhouse (SR), Creasy (DM) and Gaunt (IF). Three-generation toxicity study of rats ingesting Green S in the diet. Food and Chemical Toxicology 25(12); 1987; 985-993

Green S was fed to rats of both sexes over three generations at levels of 0 (control), 50, 500 or 1000 mg/kg body wt. There were no adverse effect of treatment on body wt. gain, food and water consumption or the general condition of the animals. Green faces were produced by all animals and pale green colouration of urine or the bladder were seen in a few animals at autopsy. At 500 mg/kg/day no untoward effects were shown in organ wt. and post mortem examination. At 1000 mg/kg/day there were increased spleen wt. (both sexes) and increased kidney wt. (male) but no relevant histopathological changes were seen in either of the organs. Caecal enlargement was the most consistent finding in animals receiving both doses but this was not considered a toxic effect. Treatments did not also effect the reproductive performance and intra-uterine development despite there was green colouring of the amniotic sacs of fetuses. A slightly premature skeletal ossification of fetuses from 2nd generation dams was observed but was not considered related to treatment. A slightly premature eruption of the incisors during post natal development was not considered as an adverse effect. It was concluded that the no-untoward effect level in this study was 500 mg Green S/kg body wt./day. MVG

Green S

- 2708 Clode (SA). Teratogenicity and embryotoxicity study of Green S in rats. Food and Chemical Toxicology 25(12); 1987; 995-997

Daily oral doses of 0 (control), 250, 500 or 1000 mg Green S/kg body wt. were given to groups of 30 pregnant rats on days 0-19 of pregnancy. This treatment did not adversely influence maternal body wt. the numbers of implantations of pre-or -post implantation losses or of live fetuses, the sex ratio or the wt. of the litters or fetuses. No definite abnormalities were seen and the only finding in the examination of stained skeletons was a slightly more advanced ossification of the forelimbs of the offspring from females given 500 or 1000 mg Green S/kg/day. More fetuses with mucus in the trachea were found in the treated groups than in the controls but this was not considered to be a teratogenic effect. Thus no embryotoxic or teratogenic effects were detected with doses of up to 1000 mg Green S/kg/day throughout pregnancy. AS

Panceau 4R

- 2709 Brantom (PG), Stevenson (BI) and Ingram (AJ). A three-generation reproduction study of Ponceau 4R in the rat. Food and Chemical Toxicology 25(12); 1987; 963-968

Discussion of results of the study suggest that administration

of Ponceau 4R to rats over three successive generations at doses up to 120 mg/kg/day did not produce any toxic effects that could be unequivocally attributed to treatment. MVG

Ponceau 4R

- 2710 Brantom (PG), Stevenson (BI) and Wright (MG). Long-term toxicity study of Ponceau 4R in rats using animals exposed in utero. *Food and Chemical Toxicology* 25(12); 1987; 955-962

In this study the results suggest that Ponceau 4R at doses up to 1250 mg/kg/day is not carcinogenic for the rat. Also, a no-untoward-effect level of 500 mg Ponceau 4R/kg/day was established. MVG

Microorganisms

Bacteria

- 2711 Lohneis (M), Jaschke (K-H) and Terplan (G). An immunoluminometric assay (ILMA) for the detection of staphylococcal enterotoxins. *International Journal of Food Microbiology* 5(2); 1987; 117-127

An immunoluminometric assay (ILMA) was developed for the detection of Staphylococcal enterotoxins (SE) A, B, C and D in food (milk and rice). Polystyrene tubes coated with specific anti-SE-sheep IgG were simultaneously incubated with the toxin containing sample and the different isoluminol conjugated anti-SE-sheep IgG. After a wash step and addition of microperoxidase oxidation system (pH 8.6 and pH 13.0) the induced luminescence was measured. Extracts of milk and rice previously spiked with SE or contaminated with enterotoxic strains of *Staphylococcus aureus* were assayed by the ILMA and in comparison by a sandwich enzyme-linked immunosorbent assay (ELISA). At a similar sensitivity the ILMA proved to be the faster method with a satisfactory recovery of added toxin. AS

Staphylococcus

- 2712 Wieneke (AA) and Gilbert (RJ). Comparison of methods for the detection of staphylococcal enterotoxin in foods from outbreaks of food poisoning. *International Journal of Food Microbiology* 4(2); 1987; 135-143

Two commercial kits, a sandwich-ELISA and a reversed passive latex agglutination (RPLA) kit, were used together with a gel-diffusion and microtitre plate ELISA for the detection of staphylococcal enterotoxins in foods from outbreaks of food poisoning. With the ELISA kit enterotoxin was detected in foods for 15 outbreaks. In 13 of these foods the number of *Staphylococcus aureus* present was $> 1 \times 10^6$ g and in two samples of cheese enterotoxin A was found in the absence of detectable *S. aureus*. These results were similar to those obtained with the plate ELISA. With the RPLA kit, food extracts were used 5 times more concentrated than recommended by the manufacturer and enterotoxin was detected in 12 of the 15 food positive by ELISA. With the gel-diffusion method enterotoxin was found in 6 of 9 ELISA positive foods. Using both ELISA methods and the RPLA kit enterotoxin

was not detected in foods from 8 outbreaks with counts of less than or equal to 700 to 1×10^6 *S. aureus*/g. The RPLA test was easy to perform, but the sensitivity of the ELISA methods was needed to detect enterotoxins in some of the foods from outbreaks. AS

FOOD LAWS AND REGULATIONS

Nil

GENERAL

- 2713 Haslam (E) and Lilley (TH). Natural astringency in foodstuffs-A molecular interpretation. *CRC Critical Reviews in Food Science and Nutrition* 27(1); 1988; 1-40

The structures of plant polyphenols (vegetable tannins) are briefly reviewed. Their interactions with proteins, polysaccharides, and the alkaloid caffeine are discussed at the mol. levels, and these fundamental properties are related to the quality of astringency that polyphenols possess. The various ways in which astringency may be modified and ultimately lost are outlined in relation to the aging of red wines, the formation of nonbiological hazes in beers and lagers, and the ripening of fruit. AS

- 2714 Maguire (C) and Lovelace (E). Technologists and marketers in the food industry. Comparisons in information use. *Food Technology in Australia* 39(12); 1987; 565-567

Survey of food manufacturing companies in New South Wales, Australia showed that there was liaison between R&D and production staff with marketing staff and the technologists supply product information to the marketers. Communication between technologists and marketers is jeopardised if there is no proper orientation between them as the technical staff depend on overseas sources where market staff depend on local information. NGKR

FOOD PROCESSING

- 2715 Lopez Leiva (MH). The use of electrodialysis in food processing. Part I. Some theoretical concepts. *Lebensmittel-Wissenschaft und-Technologie* 21(3); 1988; 119-125

In this paper a review of the basic theory of electrodialysis is presented. Discusses electrolytic cell, concepts like transport number of an ion, permselectivity of a membrane, concn polarization and limiting current. The equipments and the types of plant-lay-outs used for different applications are also reviewed. 16 references. BV

FOOD PACKAGING

Packaging materials

Polyethylene film

- 2716 Shimoda (M), Ikegami (T) and Osajima (Y). Sorption of flavour compounds in aqueous solution into polyethylene film. *Journal of the Science of Food and Agriculture* 42(2); 1988; 157-163

Sorption of flavour compounds by the polyethylene (PE) liner of laminated pouches (PET/Al/PE) containing a flavour solution has been studied. The solution contained 43 volatile compounds (each $2 \mu\text{ litre}^{-1}$) in sugar ester solution (3 g litre^{-1}). The distribution ratios of the flavour compounds for sorption into various PE liners increased with carbon chain length of the flavour compounds from 0.01 to 0.1 for alcohols, from 0.03 to 1.23 for aldehydes, from 0.02 to 5.77 for aliphatic esters and from 0.11 to 11.6 for benzoates. In each series (all straight-chain compounds) the distribution ratios increased about threefold for each methylene group, but in the compounds composed of 11 or more carbon atoms the increment was less or negative. The distribution ratio for a given PE film was proportional to the film thickness. The distribution ratios increased with decreasing crystallinity of the PE film and the results for the films of different crystallinities suggested the existence of an impermeable boundary region surrounding the crystalline material amounting to about 20% of its volume. AS

FOOD ENGINEERING AND EQUIPMENT

Engineering

- 2717 Battacharya (S), Das (H) and Bose (AN). Effect of extrusion process variable on *In vitro* protein digestibility of fish-wheat flour blends. *Food Chemistry* 28(3); 1988; 225-231
- 2718 Munsch (MH), Cormier (A) and Chiasson (S). Equations for sorption curves of some food humectants. *Lebensmittel-Wissenschaft und-Technologie* 20(6); 1987; 319-324

Sorption curves for sucrose, corn syrup, sorbitol, glycerol, hexaglycerol, glycine, NaCl and three hydrolyzed vegetable proteins were measured using an electric hygrometer, and combined with published data. Computation of regression equations of water activity was done in terms of concn expressed as g solute/(g solute + water) (or % wt.) and as g solute/g water, as well as in terms of sucrose conversion factors E after Grover. Coeff. K for the equation of Chuang and Toledo were found to be inconsistent. AS

- 2719 Peralta Rodriguez (RD). Microcomputer routines for calculations of Bessel functions and roots of characteristic equations for heat or mass diffusion in boids with cylindrical geometries. *Lebensmittel-Wissenschaft und-Technologie* 20(6); 1987; 309-310

ENERGY IN FOOD PROCESSING

- 2720 Banik (AK) and Banik (A). Bioenergy from agro-industrial by-products and waste. *Science and Culture* 54(6); 1988; 209-211

FOOD CHEMISTRY AND ANALYSIS

Chemistry

- 2721 Arakawa (N), Doke (S), Kurata (T), Utsugi (Y) and Ohashi (M). Method for ascorbic acid determination with oxygen electrode. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi)' 35(6); 1988; 399-404 (Ja).

Ascorbic acid (AsA) oxidized specifically by ascorbate oxidase (ASOD) was determined by the measurement of the decrease in dissolved oxygen (DO) in the water sealed, small reaction system of a Clark oxygen electrode. The effects of temp, pH, and buffer concn of reaction mixture on the DO uptake (mM AsA equivalent) were examined. The most suitable AsA analysis with the oxygen electrode was proved. So far as the analysis for AsA standard solutions, a linear relationship was found between the DO uptake and AsA concn. Furthermore AsA concn was twice DO uptake, thus making it possible to determine AsA without using calibration curve. The content of AsA in orange juice sample determined by the present method has a good comparability to that of the 2, 4-dinitrophenylhydrazine (DNP) method and high performance liquid chromatography (HPLC), and the recovery rate of AsA added to the orange juice ranged from 97 to 105%. Thus, this method could be available for the rapid and accurate determination of AsA contents in foods. AS

- 2722 Asghar (A), Gray (JI), Buckley (DJ), Pearson (AM) and Booren (AM). Perspectives on warmed-over flavour. *Food Technology* 42(6); 1988; 102-108

Lipid-oxidation is one of the major causes of deterioration in the quality of meat and meat products, particularly during frozen storage. Oxidative deterioration of meat lipids can directly affect many quality characteristics such as colour, flavour, texture, nutritive value and safety. The term warmed-over flavour (WOF) was introduced to describe the rapid onset of rancidity in cooked meat during cold storage. This article presents a summary of WOF research in the 1970s and early 80s, an overview of some of the mechanisms proposed for the initiation of lipid peroxidation in biological membranes and a review of studies in lipid peroxidation in meats. 72 references. GAR

- 2723 Bailey (ME). Inhibition of warmed-over flavour with emphasis on Maillard reaction products. *Food Technology* 42(6); 1988; 123-126

This article is a review of the antioxidants that have been used, as well as the potential use of Maillard reaction products as antioxidants. 62 references. GAR

- 2724 Biguet (B) and Labuza (TP). New model gel system for studying water activity of foods. *Journal of Food Processing and Preservation* 12(2); 1988; 151-161

In this study the development and characterisation of an agar/microcrystalline cellulose model system has been presented. In this new system the moisture equilibrium and diffusion properties have been measured. This model system showed marked hysteresis with both swelling and structure collapse. It can be used over the whole range of water activity for studies on packaging moisture transfer and kinetics of chemical changes in diverse food system. NGKR

- 2725 Kim (SR), Lane (RH), Abdel-Ghany (M) and Stitt (KR). Influence of extractant on L-ascorbic acid recovery from selected foods and beverages. *Journal of Food Quality* 10(1); 1987; 1-7

In this investigation recovery studies of L-ascorbic acid from selected vegetables, beverages and cereals were carried out by using 3 metaphosphoric acid containing reagents 3% trichloroacetic acid and cold 0.05 M perchloric acid. The stability of ascorbic acid in these extracting agents was followed over a 4 h period. It was seen that all the extractants yielded similar results for the beverages but TCA extracts of spinach and perchloric acid extracts of tomatoes and cereal products gave lower results than the other extractants. It was also found that L-ascorbic acid content of green beans extracted with perchloric acid, TCA and 3% metaphosphoric acid -8% HOHC differed from their initial values at 2, 4 and 4 h resp. NGKR

- 2726 Phillippy (BQ), Jhonston (MR), Tao (S-H) and Fox (MRs). Inositol phosphates in processed foods. *Journal of Food Science* 53(2); 1988; 496-499

Myo-inositol bis-, tris-, tetrakis-, pentakis- and hexakisphosphates (IP2-6) were quantified in nine thermally processed or fermented food products. Total inositol phosphate content (mmol/kg dry wt.) ranged from 1.35 in white bread to 23.26 in tofu and 26.05 in soy isolate. In all food analyzed, inositol hexakisphosphate (phytic acid) accounted for more than 40% of the total inositol phosphates on a molar basis. Step-gradient ion exchange and ferric chloride precipitation methods for phytate determine were evaluated with a soy isolate sample to which inositol phosphates or adenosine triphosphate (ATP) had been added individually. Both methods measured all of the inositol phosphates, while the former also measured ATP. AS

Chemistry (Analytical)

- 2727 Roozen (JP) and de Groot (J). Analysis of low levels of trypsin inhibitor activity in food. *Lebensmittel-Wissenschaft und-Technologie* 20(6); 1987; 305-308

FOOD MICROBIOLOGY AND HYGIENE

Enzymes

Amylases

- 2728 Germain (P) and Crichton (RR). Characterization of chemically modified Beta-amylase immobilized on porous silica. *Journal of Chemical Technology and Biotechnology* 41(4); 1988; 297-315

The method of immobilisation, earlier developed for soluble chemically thermostabilised cellobiose, was applied to Beta-amylase, an enzyme hydrolysing a macrosubstrate. Particular attention was paid to the relative activity and thermostability of immobilised enzyme. The immobilised forms of the enzymes were used for 14 days at 55 °C in continuous substrate processing. The greater efficiency of the chemically modified Beta-amylase was demonstrated by a four-fold increase in maltose production compared to the classical method of immobilisation. A kinetic study confirmed the stabilisation of the Beta-amylase by a reduction of the rate constant of inactivation of the different modified enzymes. MVG

Lipases

- 2729 Ishii (C), Endo (Y), Kimoto (H) and Taniguchi (K). Inhibition of lipases by proteins and their inhibitory mechanism. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi)' 35(6); 1988; 430-439

Inhibitory activities of proteins originated from plants and animals were estimated for lipase. All proteins tested inhibited *Rhizopus delemar* and *Candida cylindracea* lipases, but they did not inhibit porcine pancreatic lipase much in contrast. Homo-poly-amino acids were employed to simplify the reaction system and consequently make clear the mechanism of the lipase inhibition by proteins. Simplified interfacial studies were also performed to explain the inhibitory mechanism. The hydrophobicity and the conformational structure of each protein were concerned with the inhibitory activity. It is probable that the protein inhibits the lipase activity by the physical separation of lipase from its substrate. AS

Microorganisms

Algae

Dunaliella salina

- 2730 Al-Hasan (RH), Ghannoum (MA), Sallal (A-K), Abu-Elteen (KH) and Radwan (SS). Correlative changes of growth, pigmentation and lipid composition of *Dunaliella salina* in response to halostress. *Journal of General Microbiology* 133(9); 1987; 2607-2616

The growth rate of *Dunaliella salina* was optimal in the presence of 2.5 to 5% (w/v) NaCl and growth continued up to 30% NaCl. The carotene to chlorophyll ratio gradually increased from about 1.1 at 2.5% NaCl to 7.7 at 30% NaCl and the chloroplast showed some degeneration. However, with 30% NaCl, intact thylakoids were still recognized. The total lipid content of the cells decreased with increasing salinity but the major lipid classes in all extracts were monogalactosyldiacylglycerols, digalactosyldiacylglycerols, sulphoquinovosyldiacylglycerols and phosphatidylglycerols. Considerable proportions of diacylglycerotrimethylhomoserines were also present, whereas the proportions of phosphatidylcholines and phosphatidylethanolamines were relatively low. Increasing the salinity of the medium resulted in a large increase in the proportions of constituent linolenic acid (18:3) both in total lipids and in the galactolipids and of palmitoleic acid (16:1) in phosphatidylglycerols. The results are discussed in view of the probable relation of chloroplast lipids to photosynthetic activity, and the fact that the osmoregulator glycerol is produced via photosynthesis. AS

Bacteria

- 2731 Urakami (T) and Komagata (K). Cellular fatty acid composition with special reference to the existence of hydroxy fatty acids, and the occurrence of squalene and sterols in species of *Rhodospirillaceae* genera and *Erythrobacter longus*. *Journal of General and Applied Microbiology* 34(1); 1988; 67-84

Hydroxy fatty acid composition and the existence of squalenease, HOP-22(29) one and Hopan-22-01 explained the heterogeneity in the bacteriochlorophyll containing *Rhodospirillaceae* genera. This genera could be distinguished from another bacteriochlorophyll containing *Erythrobacter longus* on the basis of hydroxy fatty acid composition. Based on DNA base composition, the quinone system, cellular fatty acid and hydroxy fatty acid composition and occurrence of HOP-22(29)-one and Hopan-22-01, *Protomonas extorquens* was found similar to *Rhodopseudomonas Pelutris* and *R. rubra*. SUK

- 2732 Yamanaka (S), Fudo (R), Kawaguchi (A) and Komagata (K). Taxonomic significance of hydroxy fatty acids in myxobacteria with special reference to 2-hydroxy fatty acids in phospholipids. *Journal of General and Applied Microbiology* 34(1); 1988; 57-66

The cellular hydroxy fatty acid composition of myxobacteria was investigated. Strains tested included 7 strains of *Myxococcus speices* and one strain of *Archangium* together with other gliding bacteria, 2 strains of *Cytophaga* species as reference bacteria. The hydroxy fatty acids profile common in myxobacteria was characterised as 2-hydroxy 15 methyl hexedecanoic acid (2.OH iso C 17:0). In extractable lipids, 2-hydroxy fatty acids were the major hydroxy fatty acid components. In bound lipids, both 2-hydroxy and 3-hydroxy fatty acids appeared. This hydroxy fatty acid profile was different from that of *Cytophaga* sp. The myxobacteria had phosphatidylethanolamine as the major phospholipid their consisted of non-hydroxy fatty acids and approx. 50% of hydroxy fatty acids. SUK

Bacillus megaterium

- 2733 Hebeda (RE), Styrlund (CR) and Teague (WM). Benefits of *Bacillus megaterium* amylase in dextrose production. *Starch/Starke* 40(1); 1988; 33-36

A *Bacillus megaterium* amylase (BMA) has the ability to convert branched saccharides to a from that is easily hydrolyzed by glucoamylase. Consequently, dextrose production can be improved by using a combination of BMA and glucoamylase in saccharification. Benefits provided by BMA are similar to those achieved with a debranching enzyme. For instance, BMA is effective in increasing dextrose yield, while at the same time, nearly eliminating tetra- and higher saccharides. BMA can also be used to increase saccharification rate, reduce glucoamylase dosage, or maintain normal dextrose level at higher solids. Benefits of BMA have been quantified by evaluating the enzyme in combination with glycoamylase using typical industrial saccharification conditions. AS

Bacillus subtilis

- 2734 Kole (MM), Draper (I) and Gerson (DF). Production of protease by *Bacillus subtilis* using simultaneous control of glucose and ammonium concentrations. *Journal of Chemical Technology and Biotechnology* 41(3); 1988; 197-206

The effects of simultaneously controlling the concn of both nitrogen source, ammonium sulphate and the carbon source, glucose, and fermentations of *Bacillus subtilis* for the production of protease were studied. The protease yield on glucose (g of protease produce per g of glucose utilized) and protease yield on ammonium (g of protase produced per g of ammonium utilized) was greatest in simultaneous glucose and ammonium controlled fermentations. MVG

Clostridium thermohydrosulfuricum

- 2735 Turunen (M), Parkkinen (E), Londesborough (J) and Korhola (M). Distinct forms of lactate dehydrogenase purified from ethanol and lactate-producing cells of *Clostridium thermohydrosulfuricum*. *Journal of General Microbiology* 133(10); 1987; 2865-2873

Escherichia coli

- 2736 Borczyk (AA), Lior (H) and Ciehin (B). False positive identification of *Escherichia coli* 0157 in foods. *International Journal of Food Microbiology* 4(4); 1987; 347-349

False positive identification of *Escherichia coli* 0157:H7 due to *Escherichia hermanii* were encountered in foods using screening procedures based on sorbitol-MacConkey and 4-methyl umbelliferone glucuronide (MUG) media and agglutination in *E. coli* 0157 antiserum. All strains presumptively identified as *E. coli* 0157 (sorbitol-negative, MUG-negative, agglutination in 0157 antiserum) should be investigated further for yellow pigmentation, cellobiose fermentation and ability to grow in KCN in addition to standard confirmatory tests for *E. coli*. AS

- 2737 Chak (K-F) and Ellar (DJ). Cloning and expression in *Escherichia coli* of an insecticidal crystal protein gene from *Bacillus thuringiensis* var. Aizawai HD-133. *Journal of General Microbiology* 133(10); 1987; 2921-2931

Using a gene probe derived from the cloned var. Sotto insecticidal crystal protein (ICP) gene, we have cloned a *Bacillus thuringiensis* var. Aizawai HD-133 ICP gene in *Escherichia coli*. The gene encodes a polypeptide that is toxic to Lepidoptera in vivo and in vitro. The protein is expressed at a level sufficient to produce phase bright inclusions in recombinant *E. coli* strains, and these inclusions can be partially purified using discontinuous sucrose density gradients. Immunoblotting shows that the inclusions contain a 135 kDa polypeptide which reacts strongly with antiserum raised against the *B. thuringiensis* var. Kurstaki HD-1 Pl polypeptide. AS

- 2738 Dodds (KL), Perry (MB) and McDonald (IJ). Electrophoretic and immunochemical study of the lipopolysaccharides produced by chemostat-grown *Escherichia coli* 0157. *Journal of General Microbiology* 133(9); 1987; 2679-2687

Two chemically different O-polysaccharides, a low mole. mass from LPS and core LPS produced by chemostat-grown *E. coli* 0157, were analysed by SDS-PAGE, silver staining and immunoblotting. The reactivities of the different O-polysaccharides with antisera prepared against *E. coli* 0157 grown in batch culture, *Salmonella* 030 or *Brucella abortus* were very similar, showing that the O-polysaccharides share at least some antigenic detn. The reactions of the low mol. mass LPS with the antisera indicated that it was semi-rough LPS having one repeat unit of the O-polysaccharide attached to core LPS. AS

Lactobacillus casei

- 2739 Ezzat (N), el Soda (M) and el Shafei (H). The cell-bound proteinase system of *Lactobacillus casei* -purification and characterisation. *International Journal of Food Microbiology* 6(4); 1988; 327-332

The cell-wall crude extract from *Lactobacillus casei* NCD0 151

was partially purified by DEAE-Sephacel chromatography. Three active fractions were eluted. Two major peaks (eluted with 0.05 M and 0.27 M phosphate buffer) were further investigated. Peak I represented enzymatic activity with an optimum temp. of 40 °C, an optimum pH of 7.0 and was strongly inhibited by the serine proteinase inhibitor phenylmethylsulfonylfluoride. Peak II represented and enzymatic activity with an optimum temp. of 45 °C, an optimum pH of 7.5 and was totally inhibited by P-hydroxymercuribenzoate. None of the enzymes was affected by the metal chelator ethylenediaminetetraacetic acid at a concn up to 1×10^{-2} . AS

Fungi

Mushrooms

- 2740 Reper (C) and Penninck (MJ). Inhibition of *Pleurotus ostreatus* growth and fructification by a diffusible toxin from *Trichoderma hamatum*. *Lebensmittel-Wissenschaft und-Technologie* 20(6); 1987; 291-292

Reports the growth and fructification of *Pleurotus ostreatus* was inhibited by a fungicidal toxin produced by *Trichoderma hamatum*, a fungus contaminating an industrial production unit. BV

Yeasts

- 2741 Ethiraj (S) and Suresh (ER). *Pichia membranaefaciens*. A benzoate resistant yeast from spoiled mango pulp. *Journal of Food Science and Technology, India* 25(2); 1988; 63-66

An isolate of *Pichia membranaefaciens* obtained from spoiled mango pulp exhibited high tolerance towards sodium benzoate. Growth occurred in yeast extract-peptone-dextrose broth containing 1500 and 3000 p.p.m. of sodium benzoate at pH 4.0 and 4.5 resp. However, this isolate showed less tolerance to potassium metabisulphite and potassium sorbate. In mango juice of pH 3.5, and 4.0, growth was noticed in the presence of 500 and 1500 p.p.m. of sodium benzoate resp. with reduced cell population over a period of 8 days. Comparison of preservative resistance of this strain with another strain of *P. membranaefaciens* isolated from grape juice revealed that the character is specific only to the strain isolated from mango pulp. AS

- 2742 Middelhoven (WJ) and Noterman (SS). Species-specific extracellular antigen production by Ascomycetous yeasts, detected by ELISA. *Journal of General and Applied Microbiology* 34(1); 1988; 15-26

Heat stable immunogenic extracellular polysaccharides (EPS) produced by yeasts was used for identification of yeasts by competitive and sandwich ELISA. EPS of ascomycetous yeasts was found to be species specific but those of some basidiomycetous species gave cross reactions with many yeast species, ascomycetes included. SUK

- 2743 Suzuki (M) and Nakase (T). The distribution of xylose in the cells of ballistosporous yeasts. Application of high performance liquid chromatography without derivation to the analysis of xylose in whole cell

hydrolysates. *Journal of General and Applied Microbiology* 34(1); 1988; 95-103

HPLC analysis indicated 14 out of 16 species of *Bullera* to have xylose with cells. 25 species of *Sporidiobolus* and *Sporobotomyces* analysed had no xylose in their cells. Since *Sporobotomyces* had no xylose they were found to be not yeast phases of *Hersonilia*. The investigators describe HPLC as a useful method to differentiate taxa. SUK

Hygiene

- 2744 Pini (PN) and Gilbert (RJ). The occurrence in the UK of *Listeria* species in raw chickens and soft cheeses. *International Journal of Food Microbiology* 6(4); 1988; 317-326

Retail samples of 100 raw chickens and 222 UK and imported soft cheese were examined for the presence of *Listeria* sp. 60% of raw chicken (fresh and frozen) were contaminated with *L. monocytogenes* and 28% with other *Listeria* spp. including *L. welshimeri*, *L. seeligeri* and *L. innocua*. Six serotypes of *L. monocytogenes* were represented (1/2, 3a, 3b, 3c, 4b, 4d) of which more than one were isolated from some samples. 10% of the soft cheeses examined were found to contain *L. monocytogenes* at levels from $< 10^2$ /cfu/g to 10^3 /cfu/g. The incidences in cheeses from various countries were Italy (16%), France (14%), Cyprus (10%), and the UK (4%). Only 2 serotypes (1/2 and 4b) were isolated. Some samples containing both *L. innocua* was the only other *Listeria* sp. found. There was no correlation between either the contamination with *E. coli* or the processing of the original milk used to make the cheese (raw or pasteurized) and the presence of *L. monocytogenes* or other *Listeria* spp. The contribution of contaminated food to the epidemiology of listeriosis in the UK is discussed. AS

BIOTECHNOLOGY

- 2745 Merchuk (JC) and Siegel (MH). Air-lift reactors in chemical and biological technology. *Journal of Chemical Technology and Biotechnology* 41(3); 1988; 105-120
- 2746 Ratledge (C). Biotechnology group meeting extremophiles. *Journal of Chemical Technology and Biotechnology* 42(2); 1988; 289-322.

TISSUE CULTURE

Nil

FOOD ADDITIVES

- 2747 Gerdes (DL), Burns (EE) and Harrow (LS). Some effects of gelling agents and sweeteners on high and low sugar content carbohydrate gels. *Lebensmittel-Wissenschaft und-Technologie* 20(6); 1987; 282-286

Pectin, carrageenan and alginate gels were prepared with sucrose (65% soluble solids) and high fructose corn syrup of 90 dextrose equivalents (HFCS-90) (35% soluble solids). Gelling agents were added at 1% level either singly or in combination. Bound water and transition energy values were higher for the gels prepared using sucrose than for the gels prepared with HFCS-90. Syneresis volume (ml/100 cm^2 cut surface) was lower for gels prepared using sucrose. Water activity detn. using a proximity equilibrium cell, electronic hygrometer and mole fraction calculations revealed that bound water content could be predicted using water activity. The gels prepared with HFCS-90 has a higher spread ability than those with sucrose. Shear and spreadability values indicated that the type of sweetening agent had a significant effect on the sensory evaluation of gels made with pectin, carrageenan or alginates. Gels made with high methoxyl (HM) pectin and sucrose were scored highest by the panel. The HM pectin-sucrose gel was scored the highest of the high sugar content gels, while the alginate-HM pectin-HFCS gel received the highest score for the low sugar gels. Low sugar gels made from alginate and HFCS-90 formed gels with physical and sensory characteristics similar to HM pectin-sucrose gels. The gels prepared HFCS-90 had a higher spreadability than those with sucrose. AS

Antioxidants

BHA

- 2748 Kleinjans (J), Verhagen (H), Hageman (G) and Hoor (Ften). Carcinogenicity of the food additives BHA and BHT. A literature surveys. *Voeding* 48(5); 1987; 153-158 (N1).

Review on carcinogenicity of the phenolic antioxidants: BHA and BHT covers technological aspects of BHA and BHT; the lack of adverse effects in toxicity tests; induction of activity of cytochrome P450-related hepatic oxidative enzyme systems; carcinogenicity of high doses of phenolic antioxidants; phenolic antioxidants as promoters in laboratory models of chemical carcinogenesis; and extrapolation of the results of animal feeding trials to human health aspects. 64 references. BV

Colourants

Dyes

- 2749 Goel (KA) and Sharma (SD). Haematological and sero-enzymological characteristics of albino rat induced by diphenyl bis-azo binaphthion-ic acid (Congo red). *Journal of Food Science and Technology, India*

25(2); 1988; 97-98

Haemato-enzymological responses of albino rat fed Diphenyl bis-azo binaphthionic acid (DDBA) at sublethal dose (70 mg/kg body wt.) were studied for 30 and 60 days after oral administration. There was a significant reduction in RBC count and packed cell volume, and this was associated with a rise in WBC count. Hb content also increased after 60 days of treatment with a marked increase in corpuscular volume and mean corpuscular haemoglobin concn. ESR showed increased values while clotting time was normal after longterm treatment. There was significant decrease in succinic dehydrogenase while malic dehydrogenase and lactic dehydrogenases were elevated. However, there was no significant change in pyruvic dehydrogenase. Serum transaminases (GOT and GPT) were elevated after azodye administration. MVG

Dyes

Lac dyes

- 2750 Ajanta Ghosh and Indira Chakravarty. Evaluation of lac dye for hepatotoxic effects. To use as a food colouring agent. *Journal of Food Science and Technology, India* 25(2); 1988; 94-96

The effect of lac dye hepatic glutamic oxaloacetic transaminase (GOT) activity, glutamic pyruvic transaminase (GPT) activity, serum alkaline phosphatase activity, serum glutamic oxaloacetic phosphatase (SGOT) activity, and serum glutamic pyruvic transaminase (SGPT) activity, all of which are directly or indirectly related to hepatic functions has been investigated at 0 (control), 0.2, 1.0, 2.0, 10.0 and 20 mg/day for a period of 6 and 24, 7 days, 1 month, 3 months and 6 months in adult, male, albino rats. Results show that the dye does not produce any statistically significant in any of the above enzyme activities and these may not have any hepatotoxic effect. MVG

Flavours

- 2751 Maga (JA). Musty/earthy aromas. *Food Reviews International* 3(3); 1987; 269-284

This review discusses compounds responsible for earthy and/or musty aromas in various food systems, including water. Major emphasis is given to the compounds geosmin, 2-methyl-isoborneol, and various pyrazines as contributors to both desirable and undesirable aromas. Occurrences, formation pathways, their sensory properties, and methods of analysis has also been discussed. 142 references. BV

Sweeteners

- 2752 van der Wel (H), van der Heijden (A) and Peer (HG). Sweeteners. *Food Reviews International* 3(3); 1987; 193-268

This review summarizes the history of the discovery of sweetener, the various receptor theories developed in the course of time, the transduction of taste, the neurophysiological mechanisms involved in

sweet taste perception, the various sweet taste receptor sites, and the structure activity relations (SAR) explored so far. Following classes of sweeteners are discussed; carbohydrates, nitroanilines, benzamides, amino acids, dipeptides, dihydrochalcones, flavonoids, isocoumarins, sulfamates, oximes, saccharins, acesulfames, urea derivatives, sesquiterpenes, diterpenes, triterpenes, and some sweet substances isolated from plants. 237 references. BV

CEREALS

- 2753 Henderson (S). The effect of wetting or drying wheat and barley on the calibration of two moisture meters. *Journal of Stored Products Research* 24(3); 1988; 151-155

Samples of wheat and barley pre-dried or pre-wetted in the laboratory were conditioned to the same range of moisture contents as each other so that they were absorbing or desorbing moisture resp. Their moisture contents were determined with a capacitance and a resistance moisture meter (a Sinar Agritec Moisture Computer and a Protimeter Mini Mark IV resp.), and compared with results obtained with an oven-drying standard method. Abnormally high meter results were obtained for adsorbing samples one day after adding water, but results were not affected one day after drying. Otherwise, moisture content results changed little with time during the 10 wk experiment. The accuracy of both meters was reduced when measuring the M.C. of grain recently wetted in the laboratory. This must be taken into account when measuring the M.C. of grain recently wetted by rain because results are likely to be erroneously high. Recent drying did not appear to affect the results. AS

Barley

- 2754 Cooke (LA) and LaBerge (DE). Barley nobody malts. *Technical Quarterly, Master Brewers' Association of the Americas* 25(1); 1988; 36-40

Barley proteins

- 2755 Skerritt (JH). Hydrolysis of barley endosperm storage proteins during malting. I. Analysis using monoclonal antibodies. *Journal of Cereal Science* 7(3); 1988; 251-263

Analysis of endosperm protein extracts from a range of cvs differing in malting quality, by acid-gel and sodium dodecyl sulphate-polyacrylamide gel electrophoresis showed that various hordein proteins were hydrolysed at different rate during malting. Modification of 1 M urea/mercaptoethanol-soluble proteins was considerably greater than that seen when total (SDS/ dimethylformamide/ mercaptoethanol-soluble) protein extracts were analysed. Apparent modification of each hordein group to proteins of slightly altered mobilities was observed in each cultivar examined. In immunoblotting experiments using monoclonal antibodies with specificities for various prolamins, some antibodies bound well to barley proteins but not to

malt proteins these experiments also highlighted differences in the modification rates of specific hordeins in each group. In malts, antibody-binding proteins of higher mobilities than those found in barley extracts were observed, suggesting that stable intermediate peptide species may sometimes form during hordein hydrolysis. These results suggest that monoclonal antibody-based immunoassays may be useful for quantifying the modification of specific endosperm proteins during malting, and in the identification of hordeins resistant to modification. These undegraded hordeins may lead to quality problems in malt processing, especially brewing. AS

- 2756 Skerritt (JH) and Henry (RJ). Hydrolysis of barley endosperm storage proteins during malting. II. Quantification by enzyme- and radio-immunoassay. *Journal of Cereal Science* 7(5); 1988; 265-281

Oats

- 2757 Symons (SJ) and Flucher (RG). Determination of variation in oat kernel morphology by digital image analysis. *Journal of Cereal Science* 7(3); 1988; 219-228

Oat (*Avena sativa* L.) kernels were selected for processing using physical characteristics. Because of the importance of kernel morphology to the oat processing industry kernel features were measured by digital image analysis. Kernel area was highly correlated ($r = 0.98$) with kernel wt., whereas frequency profiles of kernel length and aspect ratio (width/length) were two features which differed both within and between populations of six domestic oat cvs. The cvs also differed in the proportions of primary to secondary kernels. Primary and secondary kernels were of similar length for all six cvs. Results from three cvs grown at two test locations show that environment influences both aspect ratio and kernel length profiles. While for a single location, variation in kernel morphology reflects genotypic differences between cvs, differences between locations reflect environmental influences upon the genome. AS

- 2758 Symons (SJ) and Fulcher (RG). Relationship between oat kernel weight and milling yield. *Journal of Cereal Science* 7(3); 1988; 215-217

Oat cleaning and processing is based on physical characteristics such as size, shape and density of kernels. Although kernels are sorted according to size to improve dehulling efficiency, the final milling yield is also influenced by the combination of kernel feed rate and dehuller speed. A study of two oat cvs in which kernels were individually assigned to given wt. classes for subsequent dehulling showed that, for a constant set of milling conditions, the smaller kernels were damaged less than the larger kernels. AS

Rice

- 2759 Phillips (S), Widjaja (S), Wallbridge (A) and Cooke (R). Rice yellowing during post harvest drying by aeration and during storage. *Journal of Stored Products Research* 24(3); 1988; 173-181

Post-harvest yellowing of rice was monitored during a research storage trial in Indonesia in which bulk rough rice (2283 tonnes) was dried by aeration with ambient air and stored over a period of a yr. Yellowing and moisture content were measured in rice samples from different depths at intervals throughout the yr. A test for determining the yellowing potential of rice was applied, following observation of the effect of heat on certain mould contaminated grains. Yellowing increased from 0.05% up to 4.5-5.5% when the grain was dry, at moisture contents of less than 14%. This was related to earlier mould growth before and during the drying period, particularly in the upper layers of grain which had taken longer to dry. Fungi of the genera *Aspergillus*, *Penicillium* and *Rhizopus* were detected in the rice. *Rhizopus* sp. *Aspergillus flavus*, *A. candidus* and species of *Penicillium*, including *P. purpurogenum* and *P. miczynskii* were associated with active mould growth. Observations on their growth in relation to grain discolouration could not pinpoint the cause of yellowing. The exact role of fungi in rice yellowing has yet to be determined and forms the subject of further investigation. AS

- 2760 Reyes (VGJr) and Jindal (VK). Effects of heat treatments on the head yields of high moisture rough rice. *Journal of Food Science* 53(2); 1988; 482-487

The influence of high temp. heat treatments on the head yields of rough rice having moisture in the range 8-30% wet basis was investigated using an experimental rotary conduction heating unit with constant agitation. Based on the time temp. history of bulk grain, reaction kinetic parameters (F_C and Z_C values) were determined for specified changes in head rice yields for general application. The estimated isothermal heating time (F_C values) were related to the reference bulk grain temp. (T_{ref}) and initial moisture of rice samples (IMC). The plots of F value and T_{ref} led to the detn. of Z_C value and its dependence on the IMC of rough rice. AS

- 2761 Wooton (MS), Djojonegoro (H) and Driscoll (R). The effect of Gamma-irradiation on the quality of Australian rice. *Journal of Cereal Science* 7(3); 1988; 309-315

Paddy rice of the Australian long grain var. Inga was Gamma-irradiated with 0-10 KGy (0-1000 Krad) at 16.3 and 25.1% moisture. The rice was then assessed for milling yield, germination rate, microbial counts, colour, total and soluble amylose, water absorption during cooking, and starch crystallinity by X-ray diffraction. Milling yield and total amylose were unchanged but microbial numbers, germination rate and water uptake during cooking decreased with radiation dose. Increases occurred in yellowness and soluble amylose in the grain, and in starch crystallinity. Of these, changes in germination rate, yellowness and starch crystallinity were more pronounced in rice irradiated at the higher moisture content. On the basis of organoleptic qualities, gamma-irradiation of the rice should be limited to a max. dose of 1 KGy. AS

- 2762 Yap (AB), Ilag (LL), Juliano (BO) and Perez (CM). Soaking in *Aspergillus parasiticus*-inoculated water and aflatoxin in parboiled

rice. Human Nutrition: Food Sciences and Nutrition 41F(3/4); 1987; 225-229

The traditional village practice of parboiling was simulated by soaking rough rice in contaminated water prior to steaming. In the simulation boiled water inoculated with both rough rice colonized by *Aspergillus parasiticus* toxigenic strain NRRL 2999 and its dislodged spores (1×10^3 ml) was used. Soaking 4 days at 30-32 C followed by parboiling for 20 min showed no aflatoxin in brown rice and 5 µg/kg total aflatoxin on hull in four rice cvs. Dry matter loss was highest for waxy rice and lowest for intermediate-and-high-amylose rices. The aflatoxin was assayed using the minicolumn technique. AS

Rice bran

- 2763 Narasimhan (KS), Rajendran (S) and Majumder (SK). Studies of infestation of acid-stabilized rice bran with flour beetle (*Tribolium castaneum* Herbst). Journal of Food Science and Technology, India 25(2); 1988; 108-110

Rice bran stabilized by treatment with concentrated hydrochloric acid at 4.0 and 5.5% levels was highly unfavourable for the multiplication of red flour beetle, *Tribolium castaneum* Herbst. When adults were released into the treated bran for 15 days, the population at the end of 45 days were resp. 3 and 1% of that observed with control bran. Infestation studies with egg, larval and adult control stages indicated that the acid treatment had a detrimental effect on larvae particularly the younger ones. Larval survivors in treated bran failed to reach the adult stage even after 45 days. AS

Rice flour

- 2764 Fondevilla (MP), Liuzzo (JA) and Rao (RM). Development and characterization of a snack food product using broken rice flour. Journal of Food Science 53(2); 1988; 488-490

A snack food utilizing broken rice flour as its main ingredient was developed and characterized. One hundred per cent rice flour displayed the best characteristics over mixtures with other carbohydrate sources to develop a snack food. Optimum gelatinization time (15 min), moisture content (12-15%) and frying temp. (196 C) were investigated. Physical and sensory analyses during a 4 wk storage period showed the following; no significant ($P > 0.05$) change in colour, flavour, acceptability and brittleness; significant ($P < 0.05$) changes were noted in toughness/chewiness and crispness. The product was considered acceptable by a 12-member trained panel. AS

Wheat

- 2765 Sokhansanj (S) and Nelson (SO). Dependence of dielectric properties of whole-grain wheat on bulk density. Journal of Agricultural Engineering Research 39(3); 1988; 173-179

The object of this work was to study the effects of bulk density

on dielectric properties of wheat of different moisture contents at frequencies from 1 to 2450 MHz. Samples of hard red winter wheat were conditioned to moisture contents of 3.4, 10.4, 14.5, 18.2 and 24.4% (W.b). A subsamples from each conditioned sample was manually adjusted to bulk densities ranging from 0.6 to 0.9 g/cm³ and the dielectric properties were measured at frequencies of 1, 18, 300 and 2450 MHz. The results showed that bulk density variation interfere with dielectric moisture measurements. It was also observed that the bulk density has a major influence on the dielectric constant but, lesser influence on the loss factor. A calibration equation for estimating moisture content from dielectric constant and bulk density and an empirical equation for estimating the loss factor from bulk density and moisture content were developed. RS

- 2766 Wood (PJ) and Jorgensen (KG). Assay of (1-3) (1-4) -Beta-D-glucanase using the insoluble complex between cereal (1-3) (1-4)-Beta-D-glucan and congo red. *Journal of Cereal Science* 7(3); 1988; 295-308

The complex formed by precipitation of (1-3) (1-4)-Beta-D-glucan from oats or barley with congo red may be used as an insoluble substrate for assay of (1-3) (1-4)-Beta-D-glucanase activity. After washing to remove excess dye, substrates were obtained which remained essentially insoluble in the absence of enzyme, but in the presence of enzyme released soluble dyed products linearly with time. The rate of release of dye was proportional to the enzyme activity and was also influenced by dye content and sources of the substrate. Calcofluor could also be used to prepare an insoluble substrate. The method was useful for measuring enzyme activities of the same order of magnitude as in viscosity assay of activity and was used to measure Beta-D-glucanase activity in some commercial enzyme preparations and in barley malt. AS

MILLETS

Corn

- 2767 Aguerre (RJ) and Suarez (C). Kinetics of colour change in corn. Effect of temperature and moisture content. *Lebensmittel-Wissenschaft und-Technologie* 20(6); 1987; 287-290

Corn grain exposed to higher temp. produces a more significant colour deterioration than moisture variation. Assuming zero-order reaction kinetics, the activation energy of colour change was 17 Kcal/mol. BV

- 2768 Osman (RO), Ahmed (FA), Khalil FA) and Ali (MS). Effect of some herbicides as plant growth regulators on the chemical composition of Zea maize grains. *Food Chemistry* 28(3); 1988; 167-176

Field exp. were conducted to evaluate the effect of the foliar application of four potent herbicides, i.e. atrazine, linuron, prometryn, and pyrazone at three different concn on the chemical

constitution of Zea maize grains. Chemical analyses of the grains indicated the following effects of the herbicides. The dry wt. was increased generally with all concn of herbicides used. however, some concn caused a moderate decrease. All treatments increased the protein content of the grains, the increase varied from 4.93% to 20.7% according to the type of treatment. Some of the amino acids increased (e.g. threonine, serine and glycine) and others decreased (i.e. isoleucine, tyrosine, phenylalanine and arginate), hydroxyproline appeared after most treatments and was not found in the untreated plants. The total carbohydrate and soluble carbohydrate were decreased with all treatments. AS

Corn chips

- 2769 Robards (K), Kerr (AF), Patsalides (E) and Korth (J). Headspace gas analysis as a measure of rancidity in corn chips. *Journal of the American Oil Chemists' Society* 65(10); 1988; 1621-1626

Headspace analysis by gas chromatography (GC) and gas chromatography-mass spectrometry (GC-MS) has been used to identify and quantify volatiles formed in the oxidative deterioration of corn chips. The effect of light and temp. on the formation of propanal, pentanal and hexanal in stored chips was examined and the data correlated with the results of sensory evaluation. The procedure is suitable for determining the concn of pentanal and hexanal below one p.p.m. which is below the level where rancidity based on sensory evaluation is detected. Problems associated with solute partitioning and sample decomposition in the analysis also were investigated. AS

Corn starch

- 2770 Hasse (NU) and Kempf (W). Effect of wet-preservation of corn on starch quality. *Starch/Starke* 40(1); 1988; 15-19

Freshly harvested maize, having 30-40% moisture could be wet-preserved at 4 °C in sodium hydrogen sulphite solution or by lactic acid fermentation (ensiling) of corn-cob mix for 24 and 20 wk resp. of the experimental period. The proximate composition, viscometric behaviour in Brabender viscometer and freeze-thaw stability of starch isolated from the preserved material did not show any material difference from the starch isolated from the initial control sample. These methods therefore provide alternatives to drying and then storage of maize for the industrial production of starch. SZA

- 2771 Takeda (Y), Shitaozono (T) and Hizukuri (S). Molecular structure of corn starch. *Starch/Starke* 40(2); 1988; 51-54

The mol. structure of corn starches, prepared from kernels steeped in water, in sulphite and in alkaline solution, and a commercial product from kernels of the same source, were investigated. The amyloses obtained were small mole. (number and wt. av. degrees of polymerization, 930-990m and 2270-2550 resp.) and comprised nearly equal numbers of branched (5.3 chains and av.) and unbranched mol. The amylopectins had av. chain lengths of 21-22 and Beta-amyloysis

limits of 58-60%. Their relatively high iodine affinities (1.05-1.25 g/100g) and chain length distributions suggested the presence of long Beta-chains with widely spaced side chains. All the starches showed similar structures, but their phosphorus contents (5-122 p.p.m) varied with the steeping condition. AS

PULSES

- 2772 Kurien (PP). Processing and utilization of grain legumes. *Human Nutrition: Food Sciences and Nutrition* 41F(3/4); 1987; 203-212

Grain legumes are major food adjuncts in the diets of the people of developing countries. A number of food legumes are grown and consumed in a variety of food preparations, alone or in combination with cereals or oilseed meals. A stable number of primary processing technologies have been evolved to prepare storable primary products. Some of them have developed into organized food industries in certain regions. These and the secondary utilization technologies like cooking, toasting, frying, sprouting, fermenting, and blending with other raw materials are surveyed briefly. AS

- 2773 Paredes-Lopez (O), Maza-Calvino (EC), Gonzalez-Castaneds (J) and Montes-Rivera (R). Physical-chemical and functional properties of common bean (*Phaseolus vulgaris*) starches. *Starch/Starke* 40(1); 1988; 11-15

Starch isolated from two high yielding var. viz, negroqueretaro (I), and bayocel (II) of *Phaseolus vulgaris* was studied in comparison to commercial samples of maize starch for various physicochemical and functional properties. The yield of starch from beans was 31.5% and 28.5% for I and II resp. Granule size followed the order I > II maize. The legume starches had similar water absorption capacity as maize starch but formed stable gel at lower concn. The swelling and solubility of starches were temp. and pH dependant. The solubility of bean starches was higher than of maize at low pH, almost similar at neutral pH but less at alkaline pH. Brabender paste viscosities followed the order maize > I > II. Highest viscosity in each case was shown at PHS. Bean starches did not show any breakdown during heating at 90 °C and showed very little retrogradation tendency during cooling phase. Use of bean starches, particularly of I is suggested in food and industrial applications. SZA

- 2774 Peace (RW), Keith (MO), Sarwar (G) and Botting (HG). Effects of storage on protein nutritional quality of grain legumes. *Journal of Food Science* 53(2); 1988; 439-441, 459

The effect of storage under moderate conditions (12% relative humidity and 20 °C) on protein nutritional quality of legumes grown in Canada (faba bean, lentil, seafarer, pinto and black beans and trapper and century peas) was determined. Little change in legume amino acid contents and only slight changes in relative net protein ratio (RNPR) and true crude protein digestibility occurred over the three yr. No

consistent changes were seen in plasma amino acids of rat fed the stored legumes, although plasma methionine and tryptophan were lower compared to casein-fed rats, reflecting dietary deficiencies in these amino acids. Amino acid scores indicated that tryptophan and sulphur amino acids were first and second limiting, resp. in most of the legumes. Correction of amino acid scores for true digestibility of protein in the legumes greatly improved correlation coeff. between scores and RNPR. AS

- 2775 Price (KR), Eagles (J) and Fenwick (GR). Saponin composition of 13 varieties of legume seed during fat atom bombardment mass spectrometry. *Journal of the Science of Food and Agriculture* 42(2); 1988; 183-193

A mass spectrometric technique is described which provides a finger print of the saponin composition in crude extracts of 13 var. of bean seed. The identity of individual saponins was confirmed using HPLC. The ability of this technique to predict the presence of unidentified saponins and, hence, its use for monitoring fractionation or isolation procedures is discussed. AS

Beans

- 2776 Del Valle (FR) and Marco (E). Production of quality quick-cooking beans by a cooking/dehydration process. *Journal of Food Processing and Preservation* 12(2); 1988; 83-93

This research has been carried out to develop a simple process based on precooking followed by dehydration for the production of quick cooking beans with processing conditions which are optimum for max. flavour development during cooking max. flavour retention during dehydration, reduction in butterflying during dehydration resulting in min. cooking time for the dehydrated product. This has been done by blanching common beans (*Phaseolus vulgaris*) in boiling water to a water/bean ratio of 0.8, cooking at 15 psig for 2 h, and during with air at 100 C and 700f Pm tray depth of 5 cm, to 10% moisture. The results showed that bean flavour development in cooking increased with increasing W/B ratio, cooking pressure and time. The recooked dry bean quality was seen to increase with increasing air temp. and decreasing velocity and W/B ratio; butterflying also depended mostly on W/B ratio, decreasing sharply with decrease of the ratio. NGKR

Bengal gram

- 2777 Thomas (A), Soni (GL) and Singh (R). Role of dietary fibre from Bengal gram (*Cicer arietinum*). Effect on erythrocyte membrane-bound enzymes and haematological parameters. *Human Nutrition: Food Sciences and Nutrition* 41F(3/4); 1987; 193-201

Introduction of dietary fibre from Bengal gram in hypercholesterolaemic diets caused the lowering of plasma as well as membrane cholesterol. There seems to be a direct relationship between the increase in membrane cholesterol level and the increase in osmotic fragility of erythrocyte membrane and this was also reflected in

packed cell volume and erythrocyte count. A direct relationship between the increased membrane cholesterol level and the increase/decrease in the activities of allosteric enzymes ($\text{Na}^+ - \text{K}^+$)-ATPase and acetyl cholinesterase, resp. was also observed. MVG

Cowpeas

- 2778 Pappas (G), Skinner (GE) and Rao (VNM). Effect of imposed strain and moisture content on some viscoelastic characteristics of cowpeas (*Vigna unguiculata*). Journal of Agricultural Engineering Research 39(3); 1988; 209-219

Cowpeas were equilibrated at relative humidities of 33, 57, 64.5, 67, 75, 79 and 86% over saturated salt solutions at 25 C. Stress relaxation and uniaxial compression tests were run on the cowpeas at seven different moisture contents—8.08, 13.86, 15.57, 16.97, 20.14, 22.32 and 25.45%. Using an universal testing machines the modulus of elasticity of the cowpeas at seven different moisture contents was calculated at 0.5, 1.0, 1.5 and 2.0% values, by applying the modified Hertz equation. The modulus of elasticity of the cowpeas was found to be independent of imposed strain levels upto 2%. It was also found that the viscoelastic behaviour of the cowpea samples tested can be represented by two Maxwell modulus in parallel. RS

Akara

- 2779 Bulgarelli (MA), Beuchat (LR) and McWatters (KH). Microbiological quality of cowpea paste used to prepare Nigerian Akara. Journal of Food Science 53(2); 1988; 442-444, 449

Cowpea (*Vigna unguiculata*) paste used to prepare akara was collected from three Nigerian market places and analyzed to determine populations and predominant types of bacterial, yeasts, and molds. Total aerobic microbial populations were initially high ($10^6 - 10^8$ g) and increased after 12 h incubation at 30-32 C to Ca 10^9 g. Initial coliform population were $10^2 - 10^4$ g and decreased slightly between 6 h and 12 h. Yeast/mold populations remained consistent at $10^4 - 10^5$ g. The average initial pH of 6.0 declined to 5.1 and 4.5 after 6 h and 12 h incubation, resp. Predominant bacteria consisted of Enterobacter, Klebsiella, and Lactobacillus sp. Candida sp. and Aspergillus niger were the predominant fungi isolated from the pastes. AS

Drybeans

- 2780 Rayas-Duarte (P), Satterlee (LD) and Romero (AL). Enzymatic release of peptides, methionine and cystine from drybeans following various heat treatments. Journal of Food Science 53(2); 1988; 468-472

Ground Great Northern and pinto beans (*Phaseolus vulgaris*) samples were processed under varying conditions of time, temp. and pressure and then hydrolyzed in vitro using a mixture of trypsin, chymotrypsin and amino peptidase. The hydrolyzed samples were ultrafiltrated and the peptides ($< 10,000$ daltons) were collected and analyzed for their sulphur amino acid content (methionine, cysteine,

and cystine). From 48% to 100% of the cysteine/cysteine residues in the protein were released after 6 h of enzymatic hydrolysis, whereas only 10% to 40.2% of the methionine residues were released during the same time period. The max. rate of peptide release occurred at 3 h of proteolysis, while the max. rate of methionine and cysteine release occurred at 2 h of proteolysis. AS

Faba beans

- 2781 Rahma (EH), El-Bedaway (AA), El-Adawy (TA) and Goma (MA). Changes in chemical and antinutritional factors and functional properties of faba beans during germination. *Lebensmittel-Wissenschaft und-Technologie* 20(6); 1987; 271-276

Germination improved the nutritional values by reducing tannins, phytic acid, vicine and convicine, trypsin inhibitor and hemagglutinin activity and increasing the in vitro protein digestibility in all enzyme systems used. Total ash, total protein and non-protein N also increased during germination, while reducing sugar content decreased. Bean germination improved the solubility of protein, water absorption, the emulsification capacity and the foaming properties of the bean flour but fat absorption decreased. The PAGE pattern showed significant changes with germination. The dissociation rate of high mol. wt. proteins increased on germination. Sensory evaluation of the biscuits revealed that germinated faba bean flour can replace upto 10% of commercial wheat flour in the baking formula. BV

Winged beans

Winged bean flour

- 2782 Onuma (Okezie (B) and Bello (AB). Physicochemical and functional properties of winged bean flour and isolate compared with soy isolate. *Journal of Food Science* 53(2); 1988; 450-454

The proximate composition, amino acid profile and functional properties of isolated winged bean proteins were determined and compared with soy protein isolate. Winged bean protein extracted at pH 10 and pH 12 had protein contents of about 90 and 80%, resp. Alkali extraction of winged beans proteins at pH 10 and pH 12 did not affect the amino acid distribution of the isolated proteins. Oil and water absorption, emulsion, and foaming properties of winged bean isolate compared favourably with soy isolate. Least gelation concn for winged bean isolate was 18% compared to 14% for soy isolate. Thus, winged bean protein isolate with its high protein content, high lysine, and other essential amino acid content and good functionality has a good potential as an ingredient in food products. AS

OILSEEDS AND NUTS

Groundnuts

- 2783 Santos (BL), Koehler (PE) and Resurreccion (AVA). Sensory analysis of peanut-based imitation cheese spread. *Journal of Food Quality* 10(1); 1987; 43-56

This study was carried out to develop an imitation cheese spread from peanut paste. The sensory evaluation for flavour, colour, overall acceptability and purchase intention by laboratory and consumer type panels using magnitude estimation scaling were determined. Hunter lab colour differences meter was used for colour measurements. The results showed that the preferred level of cheese flavour was 1% sample with 0.6% annato concn. Correlation was obtained between the flavour quality and acceptability. The samples with more colour were perceived as having a stronger flavour. NGKR

Groundnut flour

- 2784 Subba Rau (BH) and Srinivasan (K). Enzymatic modification of groundnut flour (by papain proteases) and its effect on functional properties. *Lebensmittel-Wissenschaft und-Technologie* 21(3); 1988; 126-130

Defatted groundnut flour was subjected to a limited protein hydrolysis either by papain or by a fungal protease under their optimal conditions of hydrolysis. The functional properties of the untreated control and the enzyme modified groundnut flours were examined. Enzyme modification increased the protein solubility, foam capacity and foam stability but decreased the emulsion capacity near the isoelectric range. Protease modified flour showed nearly 50% increase in water absorption capacity over papain modified flour. Viscosities of enzyme modified flours remained linearly proportional at higher concentrated flour (18%). BHSR

Hazelnuts

- 2785 Sanchis (V), Quilez (ML), Viladrich (R), Vinas (I) and Canela (R). Hazelnuts as possible substrate for aflatoxin production. *Journal of Food Protection* 51(4); 1988; 289-292

All the fifty samples of hazelnuts (25 roasted, 25 raw) showed fungal contamination, but none of the sample showed presence of aflatoxin. Effect of water activity, temp. and presence of potassium sorbate on growth and aflatoxin production in hazelnuts have been studied. At optimal temp. and water activity, hazelnuts inoculated with *Aspergillus parasiticus* produced high levels of aflatoxin, potassium sorbate at subinhibitory levels seemed to inhibit fungal growth but enhanced aflatoxin production. CTD

Rapeseeds

- 2786 Biston (R), Dardenne (P), Cwikowski (M), Marlier (M), Severin (M) and Wathelet (JP). Fast analysis of rapeseed glucosinolates by near infrared reflectance spectroscopy. *Journal of the American Oil Chemists' Society* 65(10); 1988; 1599-1600

Industry and plant breeders require fast methods to analyze glucosinolates in rapeseed. We tested the potential of near infrared reflectance spectroscopy (NIRS) and developed calibration equations on a large population of whole seeds. Reference methods used are high performance liquid chromatography (HPLC) and gas liquid chromatography (GLC) of desulphoglucosinolates, a glucose-release method after purification on an anion exchange column and a palladium test. In the range from 2 to 107 $\mu\text{M/g}$ and after transformation of the data in first derivative, a correlation coeff. of 0.99 was observed, as well as standard errors of estimated values of 2.15, 2.52, 2.67 and 4.07 for samples analyzed by HPLC, GLC, glucose and the palladium test, resp. With different wavelengths, a limited calibration test on seeds containing from 4 to 40 $\mu\text{M/g}$ gives a standard error of 1.91 $\mu\text{M/g}$ (HPLC). AS

Soybeans

- 2787 Molejopawiro (S), Fields (ML) and Gordon (D). Bioavailability of zinc in fermented soybeans. *Journal of Food Science* 53(2); 1988; 460-463

The bioavailability of Zn in soybean meal fermented by lactic acid producing bacteria (LAPB) and by *Rhizopus oligosporus* in tempeh fermentation as evaluated with the rat bioassay, using the slope ratio method and log total femur Zn or wt. gain versus Zn intake as response parameters. Fermentation significantly increased ($P < 0.05$) the RBV of Zn from 73.0% in boiled non-fermented soybeans (pH 6.7) to 84.5% in boiled LAPB fermented soybeans. The highest RBV (95.3%) was found in the autoclaved and LAPB fermented product (pH 6.5). *Rhizopus oligosporus* fermentation resulted in a RBV of 89.0%. Thus, fermentation in the processing of soybeans will improve Zn bioavailability in this food. AS

- 2788 Sessa (DJ), Baker (EC) and Friedrich (JP). Inactivation of trypsin inhibitors in whole and cracked soybeans with sodium metabisulphite. *Lebensmittel-Wissenschaft und-Technologie* 21(3); 1988; 163-168

Sodium metabisulphite was used to inactivate trypsin inhibitors in whole and cracked soybeans. Soybeans (400 g) steeped with 1600 ml aqueous 0.1M sodium metabisulphite at 30 °C and 65 °C for 2- and 3- h were dehulled, dried, flaked and then defatted with either 6 batch extractions of hexane at ambient temp. or with supercritical carbon dioxide for 15 min at 12,000 PSI and 84 °C. The 2- h steep treatment at 65 °C inactivated > 94% trypsin inhibitor with about 60% of the original N solubility while 3-h steep treatment produced greater trypsin inhibitor inactivation (i.e. > 97% inactivation) with decreased N solubility of 41-50%. Less decreased in N solubility was observed for

all bean samples steeped in sodium metabisulphite at 65 °C when compared with respective heat-treated controls. Gel electrophoresis patterns of protein extracts on 17-27% gradient gels before and after sodium metabisulphite treatment showed disappearance of both Kunitz and Bowman-Birk inhibitors. The processed soybean flakes, after milling, retained from 94 to 755 p.p.m. residual sulphite. Supercritical carbon dioxide extraction did not prove advantageous over hexane extraction for diminishing residual sulphite. This simple soybean steep treatment may be of commercial interest to prepare soy flour with low trypsin inhibitor activity and good protein solubility. AS

Soy products

- 2789 Patel (AA) and Gupta (SK). Studies on a soy-based low fat spread. *Journal of Food Science* 53(2); 1988; 455-459

A soy protein-lipid conc. derived from the suspension obtained by grinding soaked and blanched soybeans in water was used, with suitable vegetable fats, as a base for the preparation of a low-calorie spread. Skim milk powder improved mouth-feel and flavour. Sodium citrate increased flowability of the hot spread and decreased oiling off of the finished product. Hydrocolloids such as carrageenan and guar gum could effectively enhance spreadability. Plasticizers, viz, sorbitol and glycerol, favourably influenced viscosity, and texture and flavour characteristics. Butter, annatto and Beta-carotene used as colorants, with certain commercial flavourings, rendered the product sensorily close to traditional butter. The spread had distinctly superior spreadability properties. It kept well for about 3 months at refrigeration temp. AS

Miso

- 2790 Nikkuni (N), Okada (O) and Itoh (H). Effect of soybeans cooking temperature on the texture and protein digestibility of miso. *Journal of Food Science* 53(2); 1988; 445-449

Miso samples were prepared with soybeans cooked for 10 min at different temp. (up to 100 °C). Appreciable changes in the amount of 0.2 M trichloroacetic acid-soluble N (TCA-soluble N) and the pattern of sodium dodecyl sulphate polyacrylamide gel electrophoresis (SDS-PAGE) of fermented miso samples were observed in the temp. range between 90 °C. No further changes in the TCA-soluble N and SDS-PAGE pattern of miso were observed when the cooking time was prolonged up to 3 h at 100 °C. On the other hand, a 2 h cooking period at 100 °C was required to achieve a level of softness for cooked soybeans to give an acceptable texture of miso. AS

Tempeh

- 2791 Nout (MJR), Beernink (G) and Bonants-Van Laarhoven (TMG). Growth of *Bacillus cereus* in soybean tempeh. *International Journal of Food Microbiology* 4(4); 1987; 293-301

Bacillus cereus strains isolated from retail samples of tempeh

were added in levels of approx. 10^5 cfu/g to soaking soybeans intended for tempeh manufacture. Their growth was prevented and tempeh of good quality was obtained when the soaking resulted in acidification of the beans to pH 4.85, but *B. cereus* could grow well (approx. 10^8 cfu/g) in tempeh and cause its spoilage when the soaking did not cause acidification (bean pH 5.70-6.00). Acidification of soybeans by addition of lactic acid prior to fungal fermentation required pH less than or equal to 4.4 to prevent *B. cereus* growth; at this pH tempeh of good quality was obtained. Acidification of soybeans with addition of acetic acid inhibited at pH less than or equal to 5.5 both *B. cereus* and *Rhizopus oligosporus*, the mould responsible for tempeh formation; hence, no tempeh could be obtained. Mixed inocula of *R. oligosporus* and either *Lactobacillus plantarum*, *L. casei* spp. *Alactosus* or *L. fermentum* produced tempeh of excellent quality. However, mixed inocula containing lactobacilli were not able to prevent *B. cereus* growth and subsequent spoilage when added to unacidified soybeans of pH 6.6. This indicates that soybean acidification, either by biological or by chemical means, is essential to inhibit *B. cereus* growth during the tempeh fermentation. AS

Soy proteins

- 2792 Umetsu (H) and Ichishima (E). Mechanism of digestion of bitter peptides from soybean protein by wheat carboxypeptidase. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi') 35(6); 1988; 440-447

A bitter peptide fraction from the peptic hydrolysates of soybean protein was treated with crystalline wheat carboxypeptidase. The bitterness of the bitter fraction lessened with an increase in free amino acids and finally disappeared. The enzymatic hydrolysate obtained from the digest of the bitter peptide fraction by wheat carboxypeptidase was chromatographed on Sephadex G-15. Amino acid compositions of each eluate fraction were determined by an amino acid analyzer. When the release percentage of total free amino acids was approx. 27%, those of hydrophobic amino acids with a Delta value (cal/mol) > 1600 were 27-63% except for proline, and amino acids with a Delta value < 1600 had a tendency to be released less than hydrophobic amino acids. The wheat carboxypeptidase seems to have an ability to eliminate bitter taste in enzymatic hydrolysate by releasing hydrophobic amino acids from bitter peptides. AS

- 2793 Yao (JJ), Wei (LS) and Steinberg (MP). Water-imbibing capacity and rheological properties of isolated soy proteins. *Journal of Food Science* 53(2); 1988; 464-467

Water-imbibing capacity (WIC) of isolated soy protein and rheological properties of the protein slurries from different stages of maturity were examined. WIC of isolated soy protein decreased with increasing maturity; this decrease correlated with the increase in the ratio of 7S to 11S protein. Storage time (0-6 months) had little effect on WIC of protein isolates. Consistency coeff. and flow behavior index of isolated soy protein dispersions varied with maturity; consistency coeff. decreased while flow behavior index increased with

maturation. The isolated soy protein from immature soybeans formed more viscous dispersion and showed more pseudoplasticity than that from mature soybeans. The WIC and rheological properties of isolated soy proteins at three maturation stages were related to the water ratio (total/imbibed) of their dispersions. A higher water-imbibing capacity resulted in lower water ratio with higher viscosity and more pseudoplasticity. AS

Sunflower seeds

- 2794 Veselinovic (S), Turkulov (J) and Vrtaski (Z). Contribution to the investigation of selfheating of sunflower seed during storage. *FAT Science and Technology* 90(6); 1988; 234-239

Some information are given in this work on the cause and development of fire in silos for sunflower seed storage and the way of solving this problem is analyzed. The selfheating process has been investigated in laboratory conditions. Numerous factors that influence the beginning and development of the process, like, moisture, oil content, hull quality, impurities, have been investigated. On the basis of the laboratory investigations and data obtained from real fires, some suggestions connected with the building of silos and work in them are given, with the aim of decreasing the possibility of the development of selfheating. Some suggestions are also given for the improvement of the intervention in case of fire in the silos for sunflower seed storage. AS

TUBERS AND VEGETABLES

- 2795 McCarthy (MJ) and Heil (JR). Measurement of acid diffusion on canned vegetables using pH sensitive indicators. *Journal of Food Science* 53(2); 1988; 494-495, 499

The use of pH sensitive fluorescent dyes and colour indicators for measuring acid diffusion in pH modified foods was investigated. Colorimetric pH profiles compared well with electrometric measurements. Colorimetric measurement techniques were applicable with both lightly coloured vegetables (eg potatoes, onions) and highly coloured vegetables (eg; beets, carrots). Effective mass diffusivities were calculated from pH measurement and were on the order of $10^{-10} \text{ m}^2/\text{sec}$ for a variety of acids in potatoes. AS

Root vegetables

Brassica campestris

- 2796 Dietz (HM), King (RD), Shepherd (DAL) and Turvey (A). Antinutritional and toxic effects of glucosinolates and glucosinolate breakdown products in *B. campestris* var Toria in rats. *Human Nutrition: Food Sciences and Nutrition* 41F(3/4); 1987; 213-223

The effect of intact 3-butenyl-glucosinolate and its various

hydrolysis products on the growth of rats and on the histology of thin organs was characterised. Results show feeding of diets containing *B. campestris* var. Toria flours as the sole source of protein with 3-butenyl-glucosinolate as the only glucosinolate did not evoke any severe toxic effect. Flours, in which the glucosinolate had been hydrolysed by the endogenous enzymes cofactor system did not cause any detrimental effect on organ structure of the animals. Diets with intact 3-butenyl-glucosinolate and inactivated thioglucosidase effected a similar performance of the animals. The feed quality could be significantly increased when the intact glucosinolates were hydrolysed by the endogenous enzyme after inactivation of the epithiospecifier protein to yield 3-butenylisothiocyanate only. MVG

Cocoyam

- 2797 Onayemi (O) and Nwigwe (NC). Effect of processing on the oxalate content of cocoyam. *Lebensmittel-Wissenschaft und-Technologie* 20(6); 1987; 293-295

The chemical analysis, sensory evaluation and microscopic examination show that the oxalate levels were significantly reduced by soaking the cocoyam pieces for 2 h in either EDTA, water or citric acid at room temp. 23.5 °C prior to cooking. BV

Tubers

Cassava

- 2798 Jaleel (SA), Srikanta (S), Ghildyal (NP) and Lonsane (BK). Simultaneous solid phase fermentation and saccharification of cassava fibrous residue for production of ethanol. *Starch/Starke* 40(2); 1988; 55-58

A 30% slurry of fibrous residue of cassava pulp yielded 15-16.5% reducing sugars upon hydrolysis with 2-4% (v/w) sulphuric acid at 121 °C for 30 min followed by treatment with glycoamylase. Upon fermentation, the yield of ethanol was highest (5.37%) and the amount of residual sugars was lowest (1.73%) with the use of 2.5% acid. Increasing the dose of glycoamylase (5 times) led to improved yield of ethanol (35% higher) without lowering the residual reducing sugars. The ethanol yield and productivity were better and residual reducing sugars were lower in solid phase fermentation as compared to the fermentation of liquid hydrolysate obtained by hydraulic pressing of the saccharified pulp. SZA

Cassava

Cassava starch

- 2799 Eligwe (CA), Okorie (BA), Chukwudorue (CO) and Orumwense (FFO). The adsorption of causticized cassava starch on coal-washery effluent solids in relation to flocculation. *Journal of Chemical Technology and Biotechnology* 42(2); 1988; 135-146

Effect of factors such as agitation time, polymer dosage, pH,

aging and presence of complexing agent on the adsorption-flocculation phenomena in the treatment of coal-washing effluent slurries with causticised cassava starch was studied. The adsorption process did not exhibit a Langmuir type behaviour but produced a characteristic S-shaped curve and was unaffected by pH except in highly alkaline range ($\text{pH} > 10.0$) where a marked decrease in adsorption density occurred. It was postulated from the results of the study as well as some previous studies as the subject, that the absorption mechanism was predominantly controlled by hydrogen bonding aided by hydrophobic interactions. The flocculation studies indicated that high reagent (starch) concn lead to low settling rates the reason for which was also discussed. MVG

- 2800 Franco (CML), do Rio Preto (SJ), Ciacco (CF) and Tavares (DQ). Studies on the susceptibility of granular cassava and corn starches to enzymatic attack. *Starch/Starke* 40(1); 1988; 29-32

The starch granules remaining after enzymatic hydrolysis were analyzed. Enzymatic corrosion efficiency was related to granule diameter. The intrinsic viscosity of enzymatically treated cassava and corn starch was gradually lowered by hydrolysis. X-ray analysis and observation under a polarizing microscope suggested that enzymatic corrosion must occur in amorphous areas of the granules, enzymatic corrosion occurred mainly at the surface. Corn starch granules displayed considerable surface corrosion, as well as deep radial corrosion channels. AS

Potatoes

- 2801 Ansari (FA), Mughis (A) and Ahmad (M). Calculation of thermophysical properties from transient time temperature measurements in Mashed potato. *Lebensmittel-Wissenschaft und-Technologie* 20(6); 1987; 267-270

An empirical method was developed to predict thermal diffusivity and surface film conductance for regular-shaped bodies through transient time-temp. measurements. The reliability of the new method was checked statistically and it was used to measure thermal diffusivity values of boiled mashed potato packed into copper containers to appear of infinite slabs, infinite cylinders and spheres. Transient time-temp. measurements at a single location were used with the samples exposed to a cold air-stream. Half-cooling time was calculated using the empirical relation and was found to be in excellent agreement with the measured value in each case. The effect on the thermal diffusivity of the product of adding common salt in small fractions was investigated. AS

- 2802 Garrote (RL), Silva (ER) and Bertone (RA). Effect of freezing on diffusion of ascorbic acid during water heating of potato tissue. *Journal of Food Science* 53(2); 1988; 473-474, 487

The effect of freezing on ascorbic acid losses during water heating of potato cylinders at 50, 65 and 85 °C was studied at different periods of time. Loss of ascorbic acid in frozen potato was mainly by diffusion and greater than for fresh potato. The estimated

apparent diffusivities of ascorbic acid in frozen potato during water blanching were $13.64 \times 10^{-10} \text{ m}^2 \text{ sec}$ at 50 C, $17.78 \times 10^{-10} \text{ m}^2$ at 80 C. The activation energy of the diffusion process was 3,007 cal/mol. Ascorbic acid apparent diffusion coeff. in potato tissue with pre-freezing treatment were between 80 and 90% of ascorbic acid diffusion coeff. in water in the 50-80 C range. AS

- 2803 Misra (JB) and Prem Chand. Improvement of chip colour by removal of colour reactants from potato tuber slices by water washing. *Journal of Food Science and Technology, India* 25(2); 1988; 99-100

Reducing sugars, free amino acids, and total phenolics of potato tuber slices of var. Kufri Chandramukhi were lowered significantly when slices were washed with plain water. First washing was more effective in removing phenolics and free amino acids whereas effective removal of reducing sugars was observed only after the third washing. AS

- 2804 Mondy (NI) and Munshi (CB). Chemical composition of the potato as affected by the herbicide, metribuzin. Enzymatic discolouration, phenols and ascorbic acid content. *Journal of Food Science* 53(2); 1988; 475-476, 490

The effect of metribuzin (herbicide) applications at pre-emergence (Tr. 1) and pre- and post-emergence (Tr. 2) stages on enzymatic discolouration, phenolic and ascorbic acid contents of 'Katahdin', 'Lemhi Russet' and 'Hampton' cvs was investigated. In all the three cvs Tr. 1 resulted in significantly ($P < 0.05$) lower phenolic content and enzymatic discolouration and significantly ($P < 0.05$) higher ascorbic acid than the controls. Tubers from plants receiving Tr. 2 had significantly ($P < 0.05$) higher phenolic content, enzymatic discolouration and ascorbic acid than Tr. 1. Tubers from Tr. 2 had significantly ($P < 0.05$) higher ascorbic acid than the controls but did not differ significantly in phenolic content and enzymatic discolouration from the controls. After a storage of 5 months, controls had the highest phenolic content and enzymatic discolouration followed by Tr. 1 and Tr. 2 for two of the three cvs. Tr. 2 resulted in a retardation of phenol synthesis during storage. AS

Potato starch

- 2805 Ostergard (K), Bjorck (I) and Gunnarsson (A). A study of native and chemically modified potato starch. Part I. Analysis and enzymic availability *In vitro*. *Starch/Starke* 40(2); 1988; 58-66

The availability of native and chemically modified (distarch phosphate, acetylated distarch phosphate, and hydroxypropyl distarch phosphate) potato starch to Gamma-amylase before and after drum drying was studied *in vitro*. Substitution with acetyl and hydroxypropyl groups reduced the availability of drum-dried starch derivatives to Gamma-amylase. In contrast the susceptibility of raw starch increase after introduction of hydroxypropyl groups, cross-linking with phosphate only had but minor effects on the availability to enzyme. The recovery of starch during analysis depended on (a) degree of hydrolysis-

is to glucose and (b) whether or not the substitution groups were removed. The lowest yields (60-70%) were observed in the case of substituted derivatives after boiling and enzymic hydrolysis. Enzymically unavailable starch was not recoverable as dietary fibre. SZA

Sweet potatoes

- 2806 Ajlouni (S) and Hamdy (MK). Effect of combined gamma-irradiation and storage on biochemical change in sweet potato. *Journal of Food Science* 53(2); 1988; 477-481

Sucrose of uncured Red Jewel sweet potato increased from 3.8% to 10.7% after a combined treatment of a 300 Krad dose and 4 days storage at 24 C post-irradiation (PI). Starch decreased from 16.8% to 6.1% after 16 days following a 500 Krad treatment. Phosphorylase, phosphoglucomutase and sucrose phosphate synthesis enzyme specific activities increased 2.4-, 1.8-, and 1.3- fold, resp. after 3 days PI following 200 Krad exposures compared to non-irradiated roots. The beta-amylase, phosphoglucose isomerase and sucrose synthesis specific activities increased 1.2-fold. Sucrose synthesis in the irradiated sweet potato was attributed to beta-amylase, phosphorylase, phosphoglucomutase, phosphoglucose isomerase and sucrose synthase. AS

Yams

- 2807 Ozo (ON), Robinson (JM) and Reeves (SG). The occurrence of allantoin in edible yams (*Dioscorea* Sp). *Human Nutrition: Food Sciences and Nutrition* 41F(3/4); 1987; 231-232

During study of the phenolic of edible yams, white crystals, later identified allantoin, were isolated from acetone extracts of freeze-dried yam tubers. The levels of allantoin found in yams were much higher than those in potato, sweet potato, and cassava. The anomalous high levels found in yams biggest that the purine catabolism is different from that of other root crops. In this investigation allantoin levels were determined in 10 cvs of four yam species and also in potato, sweet potato and cassava cvs. MVG

Vegetables

Brussels sprouts

- 2808 Niedzielsk (Z) and Mokrosinska (K). Freezing by liquid gases and its effect on the quality of stored Brussels sprouts. *Industries Alimentaires et Agricoles* 104(12); 1987; 1169-1172 (Fr).

Cauliflower

- 2809 Aparicio-Cuesta (MP) and Garcia-Moreno (C). Quality of frozen cauliflower during storage. *Journal of Food Science* 53(2); 1988; 491-493

A study was conducted on the change occurring in vitamin C con-

tent in frozen cauliflower stored under different conditions. During storage at -22°C , 25% vitamin C was lost after 13 months and 62.2% after 30 months. An acceptable sensory quality was conserved for 10 months; after this time, a decrease began in the characteristic flavour. Storage in a display freezer did not affect vitamin C, however, storage with temp. fluctuations was very harmful, especially regarding sensory characteristics. AS

Leafy vegetables

Alfalfa

- 2810 Hernandez (A), Martinez (C) and Gonzalez (G). Freezing of alfalfa leaf juice. Formation and solvent extractor of freezing curd. *Journal of the Science of Food and Agriculture* 42(2); 1988; 173-182

Alfalfa leaf juice obtained after mechanical fractionation of whole plants was conserved by frozen storage. The freezing produced a curd whose amount was independent of freezing storage time. The curd contained 50% of the DM and 60% of the N in the original juice. Electron microscopy showed that the curd was mainly chloroplasts. The curd separation resulted in a poor recovery of protein concn from the thawed juice. The efficiency of acetone and propan-2-ol in removing lipids and pigments from the curd was studied; all extractions were at the boiling point of the solvent. Propan-2-ol extracted the most lipid, 42% dwb, acetone 28% dwb. The two solvents extracted pigments with similar efficiency. The curd extracted with propan-2-ol produced an almost colourless protein concn. AS

Spinach

- 2811 Cheng (TS) and Eitenmiller (RR). Effects of processing and storage on the pantothenic acid content of spinach and broccoli. *Journal of Food Processing and Preservation* 12(2); 1988; 115-123

This study was carried out to compare the two commonly used blanching treatments (water and steam) on its effects on pantothenic acid content of two commonly consumed vegetables like spinach and broccoli. The effect of canning, freezing and storage on pantothenic acid content of spinach has also been studied. It has been seen that steam blanching resulted in greater TPA (Total pantothenic acid) retention than water blanching. Similar trends were seen in blanching of broccoli whereas canning of water blanched spinach resulted in a further significant loss of TPA. Frozen storage of broccoli for 60 days at -32.2°C resulted in loss of TPA and no further loss was observed between 60 and 160 days of frozen storage. FPA (free pantothenic acid) decreased to a greater extent than TPA during water blanching of both vegetables. NGKR

Okra

- 2812 Kotzekidou (P) and Roukas (T). Quality characteristics of fermented and acidified canned okra. *Lebensmittel-Wissenschaft und-Technologie* 20(6); 1987; 300-304

The quality characteristics of fermented and acidified canned okra were compared to those of conventional canned okra. Okra was fermented with either a commercial or a *Lactobacillus cellobiosus* strain and acidified with citric or lactic acid. A sensory panel found fermented okra more acceptable in terms of colour, texture and flavour than acidified or conventional canned okra. Fermented okra was less mucilaginous on the surface, with less sloughing than the other treatments. Storage was found to improve the texture and reduce the amount of sloughing of fermented okra. Leaching of ascorbic acid from okra into the brine and an increase in drained wt. were observed during storage. AS

Tomatoes

- 2813 Adegoroya (AS), Jolliffe (PA) and Tung (MA). Instrumental measures of texture of tomato fruit and their correlation with protopectin content. Effect of fruit size and stage of ripeness. *Journal of Food Science and Technology, India* 25(2); 1988; 72-74

Six textural characteristics (deformation, epicarp strength, toughness, locular resistance, compliance and firmness obtained through punch test) were compared and correlated with protopectin content in order to find the best simple characteristic that measures ripening in the tomato fruit. Fruit size affected deformation, epicarp strength and toughness values but had no significant effect on locular resistance, compliance and firmness. Toughness was insensitive to ripening. All characteristics showed significant correlation with protopectin but locular resistance, compliance and firmness showed the best correlation coeff. ($\text{Gamma} = > 0.80$). As a measure of internal firmness, the locular resistance appeared to be a good parameter for quick detn. of texture in tomato. MVG

- 2814 Yang (CC), Brennan (P), Chinnan (MS) and Shewfelt (BL). Characterization of tomato ripening process as influenced by individual seal-packaging and temperature. *Journal of Food Quality* 10(1); 1987; 21-23

In this study tomatoes were individually seal packaged and ripened at 12 and 21 C. The delay caused by this in ripening process due to seal packaging occurred prior to the turning and pink USDA colour maturity stage when stored at 21 C and 12 C resp. It has been seen that lower concn of lycopene were attributed with lower values in seal packaged fruits. Both temp. and seal packaging prolonged the ripening period but did not affect the firmness values at various colour stages of tomatoes. NGKR

Tomato paste

- 2815 Wang (SL). A comparative study of two consistometers for the measurements of tomato paste consistency. *HortScience* 23(2); 1988; 410

FRUITS

- 2816 Dalal (VB). Losses in fresh fruits and vegetables and their remedial measures. Indian Food Industry 7(3); 1988; 1-13

The author deals in detail with the matter of losses incurred in fresh fruits and vegetables with reference to pre- and post-harvest factors or causes. The efforts to reduce losses by various techniques at ambient temp. were not commercially feasible and therefore the only practical approach of commercial importance is with introduction of a well coordinated refrigerated containerization systems in transport systems reflecting on the overall economics of the situation. GP

- 2817 Gardini (F), Elisabetta Guerzoni (M) and Lerici (CR). Carbon dioxide determination with the GC method for assessing microbial shelf-life of fruit system in relation to water activity and storage temperature. Lebensmittel-Wissenschaft und-Technologie 21(3); 1988; 137-143

Measurement of metabolic carbon dioxide by head-space gas chromatography was used in the assessment of the shelf-life of fruit-based systems. The system analysed, all of which were peach based, differed as regards water activity-ranging from 0.85 to 0.99 and storage temp. ranging from 0 C to 30 C. The two test microorganisms (*Debaryomyces hansenii* and *Zygosaccharomyces bailii*) were chosen on the basis of their tendency to grow at low pH and water activity. Shelf-life maps were prepared on the basis of GC detn. of carbon dioxide during storage in relation to the water activity and temp. The proposed method presented a number of interesting aspects; it is rapid (3 min per analysis), easily applied, inexpensive, accurate and avoids sample destruction. AS

Apples

- 2818 Habibunnisa, Aror (E) and Narasimham (P). Extension of the storage life of fungicidal waxol dip treated apples and oranges under evaporative cooling storage conditions. Journal of Food Science and Technology, India 25(2); 1988; 75-77

Wax emulsion (containing 6% solids and fungicide viz Bavistin on a.i. basis 1000 p.p.m.) dip treated apples (cv 'Royal Delicious') and untreated apples stored for 42 days under ambient conditions (21-28 C, RH 30-80%) showed 6.3 plus or minus 0.5% and 9.3 plus or minus 1.7% physiological losses in wt. and 36%, 59.4% shrivelling resp. The spoilage due to fungi on storage was 8.3% in untreated and 2.7% in treated apples. Treated and untreated samples, on storage for 42 days under evaporative cooling storage conditions (22-24 C and RH 90 plus or minus 5%), showed 2.9% and 3.4% resp. without any shrivelling or spoilage even after 6 wk of storage. Coorg mandarins treated similarly with 6% waxol with the same fungicide as above had a storage life of 20 days under evaporative cooling conditions; the untreated had only a storage life of 5 days under ambient conditions. Results indicate that evaporative cooling storage gave 6 times longer storage

life for apples and 4 times longer storage life for mandarins than at ambient conditions. MVG

Breadfruits

- 2819 Tumaalii (F) and Wootton (M). Properties of starches isolated from Wester Samoan bread fruit using a traditional method. *Starch/Starke* 40(1); 1988; 7-10

.Starches isolated from the pulp of 7 var. of mature Western Samoan bread fruits using a traditional method, was analysed for proximate composition, amylose content, particle size distribution, X-ray diffraction, gelatinization behaviour, swelling power and solubility. The starches were low in non-starch materials except protein (0.37 - 1.08%), showed B-type X-ray diffraction pattern and resembled potato starch in gelatinization behaviour. Variations in granule size (0.5 -36.3 u m) gelatinization behaviour, starch damage (0.5-7.2%) and amylose content (19.3-21.7%) existed between starches of different var. and would influence selection of starch for specific purpose. SZA

Citrus fruits

Lemon

- 2820 Cohen (R). Commercial use of long-term storage of lemon with intermittent warming. *HortScience* 23(2); 1988; 400

Long term storage of lemon (*Citrus limon* (L) Burw) at 13 C for 3 months and longer resulted in a high incidence of rot. The remaining fruit became dry over ripe in colour and therefore unmarketable. Storage at less than 10 C causes chilling injury including internal membranosis. Intermittent warming for 7 days at 13 C following 21 days at 2 C eliminated chilling injury development in Eureka, and Villa France Lemon. Lemon could be kept in storage for 6 months or longer and retain their marketing quality without chilling injury. Results of 2 yr commercial cold storage lemons at optimal and suboptimal temp. are presented. BAP

Dates

- 2821 El-Nakhal (HM), El-Shaarawy (MI) and Mesallam (AS). Tamrheeb a new protein rich product from dates. *Lebensmittel-Wissenschaft und-Technologie* 21(3); 1988; 172-175

This paper describes the production of dried sheets of date homogenate Tamrheeb with skim milk powder as a source of protein. Tamrheeb products contain 18% protein in addition to vitamins and minerals. Tamrheeb may be prepared with various fruit flavours so as to meet different tastes of a wide spectrum of the population. Tamrheeb is easy to store, handle and acceptable to consumers. BV

Grapes

- 2822 Sarris (J), Prada (M), Tesniere (C), Verries (C), Romieu (C) and Flanzy (c). Endogenous ethanol determination in grape berries by atmospheric analysis of experimental surroundings. *Industries Alimentaires et Agricoles* 104(12); 1987; 1173-1176 (Fr).

Ethanol concn determined by GC in head space of closed jars containing grape berries maintained in anaerobic atm. and in temp. controlled conditions were proportional to the cellular ethanol content of berries. Thus, it was possible to follow ethanol variations in berries during anaerobic metabolism by a non-destructive and accurate method. GC detn. methods are described and results obtained with 2 sets of anaerobic metabolism assays are discussed. AS

Papayas

- 2823 Hayes (CF), Chingon (HTC) and Young (HGC). Hunter b colour measurements of papaya using a two-filter system. *HortScience* 23(2); 1988; 399

Papaya (*Carica papaya* L.) grown in Hawaii cannot be shipped to the mainland United States or to the markets in Japan without first being treated for possible fruit fly infestation. Hot water double dip treatment at 42 C for 30 min and 49 C for 20 min. is presently practiced to control fruit fly infestation. The fruit fly infestation is found only on green fruits and in quarter ripe fruit and brealler stage fruit the infestation is reported to have penetrated deeper into flesh and hence such fruit are rejected for shipment. Therefore Hunter B colour measurement is quite useful to get rid of partly ripe papaya fruit by automatic colour measurement system in a rapid on-line sorting system. In this system only fruits with a Hunter b value for colour index at the blossom end units less than 23.5 and a Hunter b value less than 27.5 are accepted. The Hunter b value is a colour index indicating relative yellowing of fruit. This system is useful to sort out papayas supposed to have fruit fly infestation. A special type of instrument units filter is described. BAP

Peaches

- 2824 Shwefelt (RL), Myers (SC) and Resurreccion (AVA). Effect of physiological maturity at harvest on peach quality during low temperature storage. *Journal of Food Quality* 10(1); 1987; 9-20

The effect of physiological maturity at harvest, firmness, colour and sensory quality of peaches maintained under normal handling and storage conditions have been studied in this investigation. The fruit colour and firmness were evaluated on the day of harvest and after 7 days storage at 5 C with the use of colour chips along with their sensory quality. It was found that colour and flavour were inhibited at 5 C but softening increased with maturity. Hence softening has to be separately studied to know the ripening physiology from flavour and colour development to assess the present practices of

handling peaches. NGKR

CONFECTIONERY, STARCH AND SUGAR

Confectionery

- 2825 Tonucci (LH) and Von Elbe (JH). Effect of cooking temperature and variations in sweetened condensed whole milk on textural properties of caramel confections. *Journal of Food Processing and Preservation* 12(2); 1988; 125-138

The variations on sweetened condensed whole milk (SCWM) which will effect the textural properties of caramel have been identified and also procedures for producing SCWM to minimise variability in caramel texture have been recommended in this paper. These variations included acidity, fore warming, microbiological quality and salt composition. From these studies it was seen that caramel texture was not affected when Ca levels in milk used in the formulation were varied in the range of 20% above to 20% below the av. value. It was also observed that the microbiological quality and acidity of SCWM had very little effect on the caramel properties. Hence it was recommended that SCWM specifications should include both processing conditions and viscosity. NGKR

Chocolates

- 2826 Bradley (RLJr) and Rexroat (TM). Acceptance and stability of chocolate and strawberry fountain syrups made with concentrated, decolorized, deionized hydrolyzed whey permeate. *Journal of Food Processing and Preservation* 12(2); 1988; 163-170

Two lots of whey permeate from ultrafiltration of sweet cheese whey were deionized, decolourized, treated with a Beta-galactosidase to hydrolyze lactose and concentrated. The second lot was heated to 75 C following conc. to decrease the potential for sugar crystallization. Each lot of concentrated decolourized, deionized hydrolyzed whey permeate (CHWP) was used in chocolate and strawberry fountain syrups as a partial or total sucrose replacement. Each syrup underwent organoleptic evaluation with comparison to a sucrose control. Samples of each syrup were also stored for 2 months at 4 C and 25 C. Chocolate syrups with complete replacement by CHWP lots 1 and 2 scored very high but only syrups made with CHWP lot 2 were stable after 2 months storage. Strawberry syrups made with complete replacement by either lot of CHWP were sweet enough but scored poor in off-flavour intensity and overall preference. Syrups made with 50% replacement scored high in overall preference but poor in off-flavour intensity. Syrups made with greater than 50% replacement of sucrose became irreversibly crystallized and discoloured after 2 months storage. CHWP had acceptable flavour and sweetness for use in highly flavoured fountain syrups and should be economical to produce and be competitive with fructose and corn sweeteners. AS

Starch

- 2827 Matsumura (M), Hirata (J), Ishii (S) and Kobayashi (J). Kinetics of saccharification of raw starch by glucoamylase. *Journal of Chemical Technology and Biotechnology* 42(1); 1988; 51-67

A practical kinetic model for the saccharification of raw starch was produced and examined under different experimental conditions. It was concluded that the adsorption of enzyme was strongly dependent on temp., and that two subsites took part in glucose inhibition, which was more pronounced at low temp. The model successfully predicted the progress of saccharification up to a high conversion, and also the progress of ethanol production in a simultaneous saccharification and fermentation. MVG

- 2828 Windhab (E), Tegge (G) and Tiemeier (U). Absolute measurements of the rheological properties of gelatinized starches. *Starch/Starke* 40(1); 1988; 20-24 (De).
- 2829 Zobel (HF). Starch crystal transformations and their industrial importance. *Starch/Starke* 40(1); 1988; 1-7

The structures and transformations of starch crystal forms A, B, C and V are reviewed from industrial view point. Reviewed also is the non-crystalline or amorphous state of starch and its role in determining the physical properties of native and gelled starches. AS

- 2830 Zobel (HF). Molecules to granules. A comprehensive starch review. *Starch/Starke* 40(2); 1988; 44-50

The mol. composition and physical aspects of starch are examined in relation to starch properties and utility. The structure and mole. properties of amylose and amylopectin are further considered for their effects on properties of starch granules and pastes. Discussion on amylopectin focusses on models featuring clusters of short chain mol. that are interlinked and regularly spaced. Low and wide angle X-ray diffraction studies are cited that confirm the cluster model and the role of amylopectin in starch crystallinity. The role of lipids in certain physicochemical properties of starch granule with particular reference to interaction with amylose in maize and potato starch is discussed. The diversity of starch in the way it is deposited in plants, its size, shape and composition is pointed out. SZA

Sugar

- 2831 Duthoit (E). Prospective study of antiseptics in the sugar refinery. *Industries Alimentaires et Agricoles* 103(1/2); 1986; 25-31 (Fr).

Briefly outlines importance of antiseptic procedures in the sugar refinery. Antiseptics were evaluated for efficacy against *Bacillus*, *Micrococcus* and *Leuconostoc* organisms, with reference to agents known to be effective. Biochemical properties is also described. RV

BAKERY PRODUCTS

Bread

- 832 Ewart (JAD). Thiols in flour and breadmaking quality. *Food Chemistry* 28(3); 1988; 207-218

A differential pulse polarograph was used to measure accessible thiols in wheat flour suspensions at pH 4.2 with phenyl mercuric acetate as the reagent. Loaf volume per gram of loaf protein (LV) showed some inverse correlation with accessible thiol content of flour. From thiols in which bread was baked from doughs with added thiols it was concluded that bread quality began to fall off in the Chorleywood bread process when 0.2-0.3 μ mol thiol per gram of flour were added. It was suggested that not more than about quarter the endogeneous thiols are rheologically active. Results showed that accessible thiol varied significantly within a var. UJSPR.

Chapathi

- 2833 Sidhu (JS), Seibel (W) and Brummer (JM). Measurement of chapathi texture using Zurick Universal testing machine. *Lebensmittel-Wissenschaft und-Technologie* 21(3); 1988; 147-152

The texture of chapathi (Indian unleavened flat bread) is a multiple parameter of quality and is one of the most important considerations affecting consumer acceptance. With the help of Zwick universal testing machine, cutting, puncture, tearing and stretching force measurements have been taken on chapathies produced from whole wheat flours varying in quality. Useful and significant coeff. of correlation have been observed between these textural measurement and sensory characteristics of chapathies, which could be made use of in quality control work as well as for predicting the consumer acceptance of chapathies. AS

MILK AND DAIRY PRODUCTS

- 2834 Rakes (PA), Hamid-Samimi (MH) and Swartzel (KR). Long-term storage of aseptically processed and packaged dairy fluids. *Journal of Food Quality* 10(1); 1987; 35-41

Milk

- 2835 Griffiths (MW), Phillips (JD), West (IG) and Muir (DD). The effect of extended low-temperature storage of raw milk on the quality of pasteurized and UHT milk. *Food Microbiology* 5(2); 1988; 75-87

The effect of storage of raw milk at 2 and 6 C on the quality of pasteurized and UHT milks produced from them has been investigated. There was no difference in shelf-lives of pasteurized milks produced

from raw milks which had no obvious physical defects, odours and taints after storage at 2 and 6 °C. This was true for pasteurized milks in the presence and absence of post-heat-treatment contamination. However, pasteurized milks of good quality could be produced from more than 80% of raw milk samples which had been stored for up to 5 days at 2 °C, but this was only possible with raw milks which had been stored at 6 °C for 2 days. Failure rates of experimentally produced UHT milks were much higher in products manufactured from raw milks stored at 6 °C for 4 days than those produced from raw milks stored at 2 °C for 4 days. The main cause of failure was due to thermostable bacterial protease associated with high levels of bacterial growth in the raw milks. Other causes of failure included spore-forming bacteria, which may have survived UHT processing, and other organisms probably introduced as contaminants on filling. AS

- 2836 Hundrieser (K) and Clark (RM). A method for separation and quantification of phospholipid classes in human milk. *Journal of Dairy Science* 71(2); 1988; 61-67

A simple, isocratic method for separating the major phospholipid classes of human milk by HPLC is described. Resolution of phosphatidylinositol, phosphatidylserine, phosphatidylethanolamine, lysophosphatidylethanolamine, phosphatidylcholine, and spingomyelin from human milk phospholipids was achieved in 30 min on a silica column. Total phospholipids were injected in 50 µl of chloroform; diethyl ether (1:2 vol/vol) and eluted with a solvent mixture of acetonitrile; methanol:sulphuric acid (100:3:0.05, vol/vol/vol) at a flow rate of 2.5 ml/min. Fractions were collected and each phospholipid class quantified by analysis of inorganic phosphorus after sulphuric acid digestion. A repeatability study with 19 samples had a coeff. of variation of 5.3%. The analytical recoveries of phospholipid standards averaged 98%. Recoveries varied with phospholipid class; variation was greatest with spingomyelin. AS

- 2837 Roberts (RF) and Torrey (GS). Inhibition of psychrotrophic bacterial growth in refrigerated milk by addition of carbon dioxide. *Journal of Dairy Science* 71(1); 1988; 52-60

Treatment of refrigerated milk with 20 to 30 mM carbon dioxide was evaluated as a method for extending storage-life by inhibiting growth of psychrotrophic bacteria. Generation times for each of five psychrotrophic pseudomonads were significantly longer when grown at 7 °C in sterile milk treated with carbon dioxide than when the same bacteria were grown in ungassed sterile milk. When raw milk were stored at 7 °C and treated with carbon dioxide the time required for aerobic plate counts to increase 10-fold was at least 24 h longer than in the same milks left untreated. Numbers of coliforms, psychrotrophs, and anaerobes (facultative and obligate) were significantly lower in raw milks treated with carbon dioxide than in untreated milks incubated at 7 °C for 6 d. AS

- 2838 Stern (KK), Foegeding (EA) and Hansen (AP). Inhibition of lipolytic activity to milk by polysaccharides. *Journal of Dairy Science* 71(1); 1988; 41-45

Cows milk

- 839 Miyagawa (K) and Namba (A). Buffer capacity of cow's milk. *Journal of Japanese Society of Food Science and Technology* '(Nippon Shokuhin Kogyo Gakkaishi') 35(6); 1988; 417-422 (Ja).

Buffer capacity Beta of cow's milk was measured in the range of pH 3 to 11 with a Beta-titrator. Beta-pH curve of the milk showed strong buffer capacity in the range of pH 3 to 6 and 9 to 11, and also showed two peaks at about pH 4 and 6. From the data of pK values of the weak electrolytes in the milk, it was presumed that Asp and Glu residues in protein, and citric and other organic acids contribute to the buffer capacity at about pH 4, and high buffer capacity at about pH 6 would be due to His, Cys residues, phosphoric, carbonic and citric acids. In the range of pH 9 to 11, the high buffer capacity would arise from Lys, Cys, Tyr residues and carbonate. Buffer capacity of whey was much smaller than that of milk, in the range of pH 3 to 6. By inoculation of *L. bulgaricus*, the peak at pH 4 was increased. Buffer capacity of the dialyzed milk was found decreased by about half of the original one in the whole pH range and, therefore, it was assumed that proteins and dialyzable components of the weak electrolytes in the milk resp. contribute to about one half of the buffer capacity of the milk. The colostrum showed twice larger buffer capacity than the normal milk and gradually decreased and reached to the normal value for milk after about 10 days. AS

Goat milk

- 2840 Ambrosoli (R), Distasio (L) and Mazzocco (P). Contents of alpha casein and coagulation properties in goat milks. *Journal of Dairy Science* 71(1); 1988; 24-28

Samples of goat milk with low and high alpha casein content collected from animals of Alpine and Saanen breeds in the same stage of lactation were compared for coagulation properties (coagulation time, rate of curd formations, curd firmness) and chemical composition (total solids, ash, total protein, total casein, whey protein, fat, Ca, P, pH). Milk with low alpha-casein had a faster coagulation time, whereas milk with high levels produced the firmer curd associated with a better chemical composition. Within high alpha casein milk, comparison between breeds showed milk from the Alpine breed had significantly better coagulation properties than that from the Saanen breed. Milk composition accounted for 27% of the variation in coagulation time, 21% of variation in curd formation rate, and 54% of variation in curd firmness. AS

- 2841 Darnton-Hill (I), Coveney (J) and Davey (GR). Goat milk-nutritional and public health aspects. A review. *Food Technology in Australia* 39(12); 1987; 568-572

This review describes the composition of goat milk, its nutritional considerations, milk allergy, microbiological considerations, effects of pasteurization on milk characteristics, public health aspects and conclusions drawn from the studies carried out in Australia.

11a. NGKR

Skim milk

- 2842 Griffiths (MW), Phillips (JD), West (IG), Sweetser (AWN) and Muir (DD). The quality of skim-milk powder produced from raw milk stored at 2°C. *Food Microbiology* 5(2); 1988; 89-96
- 2843 Palanuk (SL), Warthesen (JJ) and Smith (DE). Effect of agitation, sampling location and protective films on light-induced riboflavin loss in skim milk. *Journal of Food Science* 53(2); 1988; 436-438.

Photodegradation of riboflavin in skim milk as influenced by continuous agitation, location within the container and protective films was studied. High performance liquid chromatography was used to monitor the riboflavin concn in the milk. Retention of riboflavin in light-exposed, continuously agitated milk samples was significantly lower than in unagitated samples. Sampling positions within blow molded polyethylene milk containers also had a significant effect on light-induced riboflavin loss. After 5 days of light exposure, riboflavin retention at the top of the unagitated milk containers averaged 58% compared to 92% retention for milk located at the bottom of the containers. Metallized-oriented, polyethylene-terephthalate films used as overwraps decreased penetration of visible light into milk samples and decreased the riboflavin photodegradation. AS

Milk products

Cheese

- 2844 Crow (VL), Martley (FG) and Delagcriox (A). Isolation and properties of Aspartase-deficient variants of *Propionibacterium freudenreichii* sub sp. *Shermanii* and their use in the manufacture of Swiss-type cheese. *New Zealand Journal of Dairy Science and Technology* 23(1); 1988; 75-85

Individual colonies of *Propionibacterium freudenreichii* subsp. *Shermanii* ATCC 9614 grown on agar without lactate but containing aspartate and propionate as energy sources suggested that a small proportion (0.6%) were aspartate deficient (Aspd). These variants metabolised aspartate slowly and only after lactate exhaustion. Aspartase positive (ASP⁺) cultures exhibited high aspartase activity and used aspartate during lactate fermentation. Swiss cheese was made using Aspd and Asp⁺ cultures. The molar ratio of propionate to acetate averaged 1.5 to 1.0 in cheeses made with Asp⁺ strain and 1.8 + 1.0 in cheese made with the Asp⁺ variant. Increased succinate concn were found in cheese made from milk to which aspartate had been added to give a final concn of 20 mM and using Asp⁺ strain. Succinate production from aspartate by propionibacteria occur in Swiss-type cheese. Pyruvate and alanine detected in Swiss-type cheese is a product of lactate metabolism by propionibacteria. In all cheeses, alanine increased in concn during ripening. MCV

Cheese

- 2845 El-Neshawy (AA), Farbat (SM) and Whabahy (HA). Production of soft cheese with low fat and salt contents. Food Chemistry 28(3); 1988; 219-224

Soft cheese with low fat and salt contents was produced. The cheese milk was standardized to contain 1% or 2% fat and salt was added to milk at a level of 2%. Delvocid was added to cheese milk at a level of 20 p.p.m. The milk was coagulated. The resultant cheese was pickled in its own whey and stored at refrigerator temp. for 30 days. The resultant cheese showed acceptable quality when fresh and during the storage period. AS

- 2846 Pearce (KN), Karahalios (D) and Friedman (M). Ninhydrin assay for proteolysis in ripening cheese. Journal of Food Science 53(2); 1988; 432-435, 438

The ninhydrin chromogenic reaction was used to determine the concn of free amino groups in ripening Cheddar cheese. This assay involves dispersing cheese in citrate solution, heating an aliquot of the resulting mixture with aqueous dimethyl sulphoxide ninhydrin plus lithium acetate solution at pH 5.2, diluting, and determining the absorbance at 570 nm. The ninhydrin assay and conventional amino acid analysis for lysine in freshly made Cheddar were in good agreement. There was a steady increase in the concn of free amino groups as the cheese aged. The ninhydrin method was applied to several diverse cheese var. and compared with the trinitrobenzenesulphonic acid procedure. Possible advantages of ninhydrin assay are described. AS

- 2847 Pralt-Lowe (EL), Geiger (R (M), Richardson (T) and Barrett (EL). Heat resistance of alkaline phosphatases produced by microorganisms isolated from California Mexican-style cheese. Journal of Dairy Science 71(1); 1988; 17-23

Samples of Queso Fresco produced in California were tested for microbiological quality and alkaline phosphatase activity. Total plate counts ranged from 6 to 8 logs for freshly purchased cheeses. The majority of bacteria were nonlactic psychrotrophs. Coliform and enteric counts were greater than or equal to six logs in all samples. Colonies isolated on standard methods agar were inoculated into a variety of media and incubated at 20 C. Each culture was tested for alkaline phosphatase activity by the Scharer test. The resistance of each phosphatase-positive culture to a heat treatment of 63 C for 30 min was also determined. The degree of enzyme inactivation varied between cultures when different growth media were used. Alkaline phosphatases sensitive to pasteurization were produced by several isolates under culture conditions. The Scharer test may not be a reliable indicator of pasteurization in Queso Fresco cheeses. AS

- 2848 Sinha (RN) and Sinha (PR). Volatile and non-volatile acids produced by Clostridium sporogenes isolated from processed cheese. Journal of Food Science and Technology, India 25(2); 1988; 101-102

Five strains of *Clostridium sporogenes* were isolated from canned processed cheese and in peptone yeast extract glucose broth. Acetic acid and butyric acids, among the volatile acids, were found in all the culture filtrates to the extent of 9.8-46.6% and 18.2 to 28.8% resp. isobutyric acid, isovaleric acid, valeric acid, isocaproic acid and caproic acid were found in some of the cultures to the extent 0 - 11.3%, 0 - 31.1% and 0 - 0.9% resp. Propionic acid was produced in more of the cultures. The non-volatile acids, namely lactic acid and succinic acid, were present to the extent of 60 - 100% and 0 - 10% resp. MVG

Cheddar cheese

- 2849 Creamer (LK), Gilles (J) and Lawrence (RC). Effect of pH on the texture of Cheddar and Colby cheese. *New Zealand Journal of Dairy Science and Technology* 23(1); 1988; 23-35

The relationship between the pH or the Ca content of cheese with its textural properties were studied in several sets of Cheddar cheese (made using both calf rennet and microbial rennet) and Colby cheese. It was observed that low pH, high Ca cheese was more brittle than the control at both 6 wk and 6 months of age. Conversely, the high pH, low Ca cheese was more elastic than the control. Rate of casein proteolysis was same for cheeses made using microbial rennet. Cheese texture appeared to be more closely related to pH than to Ca content. Even in Colby cheeses, wherein the final cheese composition was altered by changing the proportion of water added to the curd at the first whey running stage, the change in Ca content from the normal level of 160-170 mmol/kg cheese down to 120 mmol/kg cheese, the physical properties of the cheeses were unchanged provided the cheese pH remained similar within each set. Investigations indicate that, cheese pH has a greater effect on texture than Ca content and that the Ca contents of cheese cannot be correlated with the compression at the yield point when cheese pH is under independent control. MCV

- 2850 Jameson (GW). Manufacture of Cheddar cheese from milk concentrated by ultrafiltration. The development and evaluation of a process. *Food Technology in Australia* 39(12); 1987; 560-564

For the manufacture of hard and semi hard cheeses a new method adopting ultrafiltration based technology has been developed in Australia. This is of particular interest as a case study in process development as the process and the connected equipment i.e. APV-sirocurd were found to give higher yield of cheese and continuous cheesemaking was found possible. NGKR

Sheep milk cheese

- 2851 Lencioni (L), Pisanelli (AM), Baldi (E), Fiorentini (R) and Galoppini (C). Sheep milk cheese made with the addition of alfalfa leaf protein concentrate. Proteolysis during ripening. *Lebensmittel-Wissenschaft und-Technologie* 20(6); 1987; 277-281

The use of leaf protein in dairy products is of great interest.

Dairy foods are consumed almost every where in the world and are a suitable vehicle to transfer into the human diet a vegetable protein sources that is widely available and has a high biological value. With this in mind, large-scale cheesemaking was carried out with sheep milk to which was added 1% of decolorized alfalfa protein conc (dec-LPC). The results show that 90% of the added dec-LPC is recovered with the enzymatic curd; the remaining 10% is thermally collectable from the whey as ricotta. The addition of dec-LPC to cheese (7.3% dry basis) results in an increase in fresh cheese yield (+22%), protein content (+6% dry basis) and nitrogen-free extracts (+85% dry basis). The amino acid profile of the extended cheese was close to that of the control. The addition of dec-LPC decreased somewhat the degree of cheese proteolysis during ripening. In particular, total soluble N and free amino acid contents in ripened extended samples were lower than in the standard cheese (-13.5% and -27.5%, resp.). Extended cheese also exhibited differences in the generation and final concn of every single free amino acid. AS

Ice Cream

- 2852 Schmidt (KA) and Smith (DE). Effects of homogenization on sensory characteristics of vanilla icecream. *Journal of Dairy Science* 71(1); 1988; 46-51

Nine different batches of ice creams that contained no emulsifier and that had been processed at various homogenization pressures were compared with a reference ice cream batch that was processed by commercial techniques (an emulsifier added and homogenized double-stage at 140.74 and 35.18 kg/cm² (2000 and 500 psi), first and second stage, resp. The samples were compared for seven sensory attributes; chewiness, greasy mouthcoating, iciness, vanilla flavour intensity loss of shape, wheying off, and curdling. Data showed differences in loss of shape and vanilla flavour intensity in some of the samples when compared with the reference sample. Vanilla flavour intensity was more pronounced in experimental samples, which indicated that the emulsifier in the reference mix in some way suppressed vanilla flavor intensity. AS

Khoa

- 2853 Goyal (GK) and Srinivasan (MR). Influence of packaging and storage on the chemical quality of khoa. *New Zealand Journal of Dairy Science and Technology* 23(1); 1988; 51-59

The effects of three different flexible packaging materials (viz poster paper, aluminium foil, low density polyethylene (LDPE) (55-60 gm², 0.02 mm and 150 guage; P1), poster paper, aluminium foil, LDPE (55-60 gm², 0.009 mm and 150 gauge;p), and MST cellulose film LDPE (30 g m and 150 guage; P3)) and tin cans (P4) on the chemical quality of three types of khoa samples (i.e., prepared in the laboratory from cow milk and from buffalo milk, and purchased from the market) stored at 37.0 plus or minus 0.5 °C and 60% relative humidity (RH) for various time intervals were studied. The khoa samples packaged in tin cans (P4) showed the least chemical changes during storage, with

increasing changes exhibited by the samples packed in the materials P1, P2, and P3 resp. The type of packaging, the type of khoa, and the storage period each individually influenced the chemical quality of the samples. AS

Whey

- 2854 Dunkerley (JA) and Zadow (JG). Coagulation characteristics of autoclaved whey protein concentrates. *New Zealand Journal of Dairy Science and Technology* 23(1); 1988; 11-22

Characteristics of coagula formed by autoclaving aqueous dispersions (12.5% w/w protein content) of whey protein conc. (WPC) prepared from Cheddar cheese whey were studied. Strong coagula were formed over the pH range 4.5-8.0 with firmness at a max. of 5N at pH 4.5, and with other max. at pH 6.0 (2.5N) and pH 8.0 (3.5N). Resistance of the coagula reached a max. at pH 4 (1300 N/m) and at pH 8 (800 N/m). Coagula ranged in characteristics from smooth gels below pH 3, to sensory pastes from pH 4 to pH 7, to rubbery pastes above pH 7. Coagula had acidic flavours below pH 5.5, with the development of preferred bland eggy flavours in the pH range from 6 to 7. The net result of the change either in an increase or decrease in the pH of a WPC dispersion of autoclaving is the effect of many competing factors involving ionic equilibria, lactose decomposition and other reactions. There was generally an increase in the pH on autoclaving at an initial pH below 6.6 and a decrease in the pH above this value. However, in the pH range from 6 to 7 the change was max. about 0.2 pH units. For manufacturing products with max. firmness, this factor must be taken into account, given the sensitivity of firmness to small changes in pH. MCV

- 2855 Garrett (JM), Stairs (RA) and Annett (RG). Thermal denaturation and coagulation of whey proteins. Effect of sugars. *Journal of Dairy Science* 71(1); 1988; 10-16

The effect of various sugars on whey protein coagulation and thermal denaturation was studied. The thermal coagulation of unfractional whey proteins was inhibited by various sugars, the disaccharides, sucrose and lactose, were most effective and the amino sugar, glucosamine, least effective in this respect. UV absorption and light scattering measurements on the thermal denaturation and coagulation of both unfractionated and individual whey proteins (alpha-lactalbumin, beta-lactoglobulin, and bovine serum albumin) showed that sucrose promotes the denaturation of these proteins but inhibits their subsequent coagulation. Hydrophobic interactions play an important role in maintaining the conformational integrity of globular proteins and they also appear to be involved in the formulation of complex intramolecular structures. Heat treatment of any solution increases the motion of the constituent molecules, thus increasing the strain on the weak interactions. Strength of forces maintaining tertiary structure determine the heat treatment required to denature the molecules. The mechanism of effect of sugars on the thermal denaturation and coagulation of protein depends upon the nature of protein-water interactions. MVG

- 856 Yoshida (S). Isolation of some minor milk proteins, distributed in acid whey from approximately 100,000 to 250,000 daltons of particle size. *Journal of Dairy Science* 71(1); 1988; 1-9

Milk proteins in acid whey were separated into five fractions according to mol. size by gel filtration chromatography. The second peak, P2, contained proteins between approx. 250,000 and 100,000 daltons. Proteins in P2 were concentrated after separation into albumins and globulins. Each protein group was isolated by DEAE chromatography and hydrophobic interaction chromatography. Isolated albumin fractions were a yellow-coloured protein of 89,000 daltons, an unidentified protein of 73,000 daltons, a Beta-lactoglobulin of 18,300 daltons and a red-coloured protein of 87,000 daltons. Two types of globulin fractions were isolated: 1) a globulin fractions that coagulated in saturated sodium sulphate but did not coagulate when dialyzed against deionized water included a brown-coloured protein of 150,000 daltons, and 2) a bovine serum albumin of 67,000 daltons with unidentified 170,000 and 30,000 daltons bands. A true globulin fraction contained a 77,000 dalton unidentified protein with several faint bands. The red-coloured protein was identified as lactoferrin and the brown-coloured protein as xanthine oxidase (EC 1.2.3.2). A yellow-coloured protein was concluded to be the denatured protein of contaminated lactoperoxidase (EC 1.11.1.7). AS

Whey protein concentrate

- 2857 Kim (CH) and Maga (JA). Properties of extruded whey protein concentrate and cereal flour blends. *Lebensmittel-Wissenschaft und-Technologie* 20(6); 1987; 311-318

Up to 20% of whey protein conc. (WPC) was successfully extruded with corn, rice and potato flours in a laboratory extruder under non-isothermal conditions with dry temp. ranging from 100 to 200 C at 15 and 25% moisture and 100 and 150 r.p.m. producing extrudates with a wide range of physical and sensory characteristics. With 10% WPC, yield was increased by up to 60% in rice and corn extrudates. Addition of WPC reduced expansion and water absorption index (WAI) under some conditions. A sensory panel preferred rice extruded with WPC over the non-WPC control. AS

Milk proteins

Casein

- 2858 Kang (YC) and Richardson (T). Molecular cloning and expression of bovine k-casein in *Escherichia coli*. *Journal of Dairy Science* 71(1); 1988; 29-40

A cDNA library was constructed using poly (A) + RNA from bovine mammary gland. This cDNA library of 6000 clones was screened employing colony hybridization using 32 P-labelled oligonucleotide probes and restriction endonuclease mapping. The cDNA from the selected plasmid, pKR76, was sequenced using the dideoxy-chain termination method. The cDNA insert of pKR76 carries the full-length sequence, which codes

for mature K-casein protein. The amino acid sequence deduced from the cDNA sequence fits the published amino acid sequence with three exceptions; the reported pyroglutamic acid at position 1, tyrosine at position 35, and aspartic acid at position 81 are resp., a glutamine, a histidine, and an asparagine in the clone containing pKR76. The MspI-NlaIV-cleaved fragment (630 base pair) from the k-casein cDNA insert has been subcloned into expression vectors pUC18 and pKK 233-2, which contain a lac promoter and a trc promoter, resp. *Escherichia coli* cells carrying the recombinant expression plasmids were shown to produce k-casein protein having the expected mobility on sodium dodecyl sulphate-polyacrylamide gel electrophoresis and being recognized by specific antibodies raised against natural bovine k-casein. AS

MEAT AND POULTRY

- 2859 Rhee (KS). Enzymic and nonenzymic catalysis of lipid oxidation in muscle foods. *Food Technology* 42(6); 1988; 127-132

This article focus on the nature and sources of catalysts that initiate or promote lipid oxidation in raw and cooked muscle tissues. A review with 49 references. GAR

Meat

- 2860 Azcona (JI), Garcia (T), Hernandez (PE), Sanz (B) and Martin (R). Sandwich ELISA for detection of horse meat in raw meat mixtures using antisera to muscle soluble proteins. *Meat Science* 22(2); 1988; 143-153

A double-antibody sandwich ELISA (enzyme-linked immunosorbent assay) has been successfully developed for the detection of defined amounts of horse meat (1-50%) in unheated meat mixtures. The assay used horse-specific antibodies obtained by immunoadsorption of the crude horse antisera onto immobilised saroplasmic extracts from chicken, beef and pig to remove cross-reacting antibodies. The purified antibodies bound to a solid support sequester horse muscle soluble proteins from meat mixtures. Further immunorecognition was made with the same antibodies conjugated to the enzyme horseradish peroxidase. Subsequent enzymic conversion of substrate gave clear optical density differences when assaying mixtures of minced beef and pig containing variable amounts of horse meat. AS

- 2861 Bawa (AS), Usborne (WR) and Orr (HL). Effect of levels of fillers and extenders on the functionality of a meat system. *Journal of Food Science and Technology, India* 25(2); 1988; 84-88

Combination of medium meat system with Promax 70, sodium caseinate and hard wheat flour was used to study various levels of extenders and fillers using a response surface design. A 2.5:3.0 (% of meat block) of hard wheat flour and extenders produced an optimal overall response of emulsifying capacity (EC), emulsion stability (ES) and water holding capacity (WHC) for both the extenders. AS

- 2862 Bawa (AS), Usborne (WR) and Orr (HL). Interactions among meat, fillers and extenders in an emulsion system. *Journal of Food Science and Technology, India* 25(2); 1988; 78-83

The possibilities of interactions upon combining different meat systems with various types of fillers like hard wheat flour, corn starch and skim milk powder and extenders such as mustard flour, Promax 70, acid washed soy conc. and sodium caseinate in emulsion systems were explored. Emulsifying capacity (EC), emulsion stability (ES) and water holding capacity (WHC) were selected as the functionality tests. The interaction among extenders and meat systems was found to be significant for EC and ES. Extenders also affected the ES. The weak meat systems resulted in the lowest WHC values. The extenders and fillers acted antagonistically in combination with the strong meat system while the effect with the other two meat systems was synergistic. AS

- 2863 Crackel (RL), Gray (JI), Pearson (AM), Booren (AM) and Buckley (DJ). Some further observation on the TBA test as an index of lipid oxidation in meats. *Food Chemistry* 28(3); 1988; 187-196

The 2-thiobarbituric acid (TBA) test used for the monitoring lipid oxidation in meat products was modified. In this modified method aqueous TBA solution was used instead of acetic acid TBA reagent. The modification prevented the formation of an interfering absorption heat at approx. 450 nm. The conversion factor for the method was determined to be 6.2. The method was further modified to allow the addition of tertiarybutyl hydroquinone (TBHQ) to raw and cooked meat samples prior to blending and heat distillation. The addition of 0.01% TBHQ (fat basis) significantly ($P < 0.05$) reduced TBA numbers of fish and chicken breast and raw chicken thigh meat, but did not significantly influence the TBA numbers for beef or cooked chicken thigh meat. UJSPR.

- 2864 Goktan (D) and Tuncel (G). Effect of ingredients on quantitative recovery of *Salmonella* in raw meat balls. *Meat Science* 22(2); 1988; 155-160

Raw meat balls in a special Turkish meal, were prepared from minced meat, bulgur, onion, garlic and different spices. In this experiment raw meat balls were prepared by using minced meat which was inoculated with *Salmonella typhimurium* at two different levels. *Salmonella* inoculated minced meat was also used in the experiment as a control. Samples were analysed at intervals. The lowest recovery of *Salmonella* was observed in raw meat balls which had been inoculated at the higher level. AS

- 2865 Hamann (DD). Rheology as a means of evaluating muscle functionality of processed foods. *Food Technology* 42(6); 1988; 66-71

Rheological parameters can be used to predict sensory texture and muscle functionality of comminuted meat products. Comminuted muscle is commonly taken to mean how well the muscle produces desirable sensory texture and stabilizes fat and water in a thermally

processed product. The gelling properties of muscle components, which determine the development of desirable structured meat product, are critical to the production of a large variety of structured meat products including sausages (made from red meat or poultry), nugget type product (poultry) and seafood analogs which simulate crab legs, lobster tails, or shrimp. Development of a texture exhibiting proper hardness (strength) and cohesiveness (deformability) is critical to all these foods. Factors affecting rheological parameters are also discussed. 27 references. GAR

- 2866 Konuma (H), Shinagawa (K), Tokumary (M), Onoue (Y), Konno (S), Fujino (N), Shigehisa (T), Kurata (H), Kuwabara (Y) and Lopes (CAM). Occurrence of *Bacillus cereus* in meat products, raw meat, and meat product, additives. *Journal of Food Protection* 51(4); 1988; 324-326

Prevalence and levels of *Bacillus cereus* contamination in raw meat, meat products and meat additives indicate 18.3% of meat product, and 6.6% of raw meat gave positive indications. The level of contamination was 10^{-1} g. Meat product additives registered a range of 10^{-2} - 10^{-4} and values on the higher side being from the samples of spices, and animal proteins. The study clearly points that meat product additives were the principal sources of *B. cereus* contamination in meat products. CTD

- 2867 Peterz (M). Storage of meat products under carbon dioxide. *Var Foda* 40(1); 1988; 45-50 (Sv).

Covers storage of meat products under carbon dioxide with reference to characteristics of carbon dioxide; effects on the microflora and microbial growth; use of solid carbon dioxide; vacuum packaging; controlled atm. packaging; and effects on shelf life of fresh meat. BV

- 2868 Sherikar (AT), Khot (JB), JayaRao (BM) and Pillai (SR). Application of polyacrylamide gel isoelectric focusing for identifying species of origin of raw and heat treated meats. *Indian Journal of Animal Sciences* 58(4); 1988; 470-486

Polyacrylamide-gel isoelectric focusing was studied to differentiate buffalo, cattle, sheep, goat, pig and poultry meats using a rod-gel system in disc-electrophoresis apparatus. In raw and heated (70°C) meats, the bands were distributed in a particular pH range and there were characteristic reproducible banding pattern, specific for each species. The zones were also species specific. However, boiled and autoclaved meats could not be differentiated as the bands were diffused, difficult to mark, specific zones were absent and the densitometric scanning also failed to produce definite peaks. Mixtures were identified by noting characteristic protein fractions of known standards, and correlating their presence or absence in the mixtures and known standards at specified pH values, occurrence of species originating protein fractions in the mixtures, loss of identity of the zones and additive banding patterns. One species could be identified even at the level of 5% addition to the other species including closely related species, viz, cattle and buffalo, and sheep

and goat, in case of raw and partially heated (70 C) meat mixtures. However, boiled and autoclaved mixtures could not be identified. Polymerization of the gels was easily achieved by tetramethylene diamine and ammonium persulphate. Densitometric scanning aided in marking the bands and identifying the mixtures. AS

Beef

- 2869 Alexander (von H) and Halzapfel (WH). The influence of extrinsic factors on the microbiological spoilage pattern of ground beef. *International Journal of Food Microbiology* 6(4); 1988; 269-280
- 2870 Allen (J), Angelo (St), Vercellotti (JR), Dupuy (HP) and Spanier (AM). Assessment of beef flavour quality. A multidisciplinary approach. *Food Technology* 42(6); 1988; 133-138

This article presents an overview of the authors investigation of warmed over flavour in meat, utilizing a multidisciplinary approach consisting of chemical and instrumental analysis coordinated with sensory evaluation. GAR

- 2871 Cecchi (LA), Huffman (DL), Egbert (WR) and Jones (WR). Chemical and physical characteristics of beef chuck muscles. Effect of electrical stimulation, hot boning and high temperature conditioning. *Journal of Food Science* 53(2); 1988; 411-415, 420
- 2872 Chandhray (SS) and Ledward (DA). Utilisation of black gram flour in beef sausages. *Meat Science* 22(2); 1988; 123-130

British fresh beef skinless sausages were prepared in which 30% of the meat, on a protein to protein basis, was replaced by black gram flour. The raw substituted sausages had higher TBA values, were paler in colour and less acceptable than the controls but the general acceptability of the cooked sausages was not affected by the presence of the flour. During storage the substituted sausages discoloured more rapidly than the controls and in addition, microbial growth become evident sooner. However, moist heat treatment of the flour prior to incorporation in the batter eliminated all these defects so that both the raw and cooked products were as acceptable as the controls. In all sausages, incorporation of black gram flour led to increased cooking losses and softer textures. AS

- 2873 Jeremiah (LE), Newman (JA), Tong (AKW) and Gibson (LL). The effects of castration, preslaughter stress and zeranol implants on beef. Part I. The texture of loin steaks from bovine males. *Meat Science* 22(2); 1988; 83-101
- 2874 Murthy (TRK) and Gaur (R). Effect of incorporation of tween 80 and magnesium chloride on the recovery of coliforms in VRB medium from fresh, refrigerated and frozen minced buffalo meat. *International Journal of Food Microbiology* 4(4); 1987; 341-346
- 2875 Singh (JN). Status of beef in Bhutan and its relative effect on Indian border area. *Indian Food Industry* 7(3); 1988; 18-19

Beef is one of the major items in the diet of Bhutanese. As a religious sentiment they do not kill their own animals for the sources of supply of beef and therefore they depend on external agency, who does not maintain hygienic conditions. This article suggest that an organised system should be set up for the processing and supply of beef in a systematic and scientific manner in the border areas of Bhutan for the welfare of Bhutanese. GP

- 2876 Wills (PA), Mcfarlane (JJ), Shay (BJ) and Egan (AF). Radiation preservation of vacuum-packaged sliced corned beef. *International Journal of Food Microbiology* 4(4); 1987; 313-322

The storage life of vacuum-packaged sliced corned beef at 85 C can be doubled by irradiation using doses as low as 2KGY. Irradiation has potential in improving the microbial quality and increasing the storage life of luncheon meats. BV

Bovines

- 2877 Jeremiah (LE), Newman (JA), Tong (AKW) and Gibson (JL). The effects of castration, preslaughter stress and zeranol implants on beef. Part 2. Cooking properties and flavour of loin steaks from bovine males. *Meat Science* 22(2); 1988; 103-121

A total of 144 male cross bred calves were allocated to our castration or implant treatments (unimplanted bulls, unimplanted steers, bulls implanted with zeranol at 100 days of age and reimplanted at intervals of 69, 93 and 56 days. Thereafter, bulls implanted with zeranol at 168 days of age and reimplanted at intervals of 93 and 56 days thereafter) and two preslaughter shipping treatments (min preslaughter stress, with cattle shipped and slaughtered within 4 h of leaving the feed to pen, normal preslaughter stress, with cattle mixed, trucked 160 km and slaughtered upto 24 h after leaving the feed lot pen). These cattle were slaughtered and striploin steaks were removed after 6 days of post-mortem aging. Evaluation of these steaks were then conducted using both an experienced laboratory taste panel and a highly trained professional flavour profile panel. Results were discussed in relation to cooking properties and flavour of loinsteaks from bovine males. DNR

- 2878 Koohmaraie (M), Seideman (SC), Schollmeyer (JE), Dutson (TR) and Babiker (AS). Factors associated with the tenderness of three bovine muscles. *Journal of Food Science* 53(2); 1988; 407-410

- 2879 Will (PA) and Reesing (EO). Palatability attributes of low voltage electrically stimulated hot boned bovine muscle. *Journal of Food Quality* 10(1); 1987; 67-72

Twelve grain-fed heifers with carcass wt. ranging from 163 kg to 232 kg were randomly assigned to low voltage electrical (45 volts. 1.5 amps. pulsation cycle of 1.5s for duration of 150s) or no stimulation treatments. The semitendinosus (ST) and supraspinatus (SS) muscle were studied using high temp. (10 h at 14 C plus 30 h at -2 C) and

low temp. conditioning (40 h at -2°C) periods. Shear force and taste panel data were taken. Shear force data indicated statistically significant differences ($P < .05$) existed between electrically stimulated and nonstimulated hot boned supraspinatus (SS) and semitendinosus (ST) muscle. The duo-trio test indicated that panelists were able to detect a difference between electrically stimulated and nonstimulated muscle ($P < .05$). AS

- 2880 Yeo (YK) and Horricks (LA). Determination of the phospholipid composition of bovine muscle by high performance liquid chromatography with emphasis on the choline and ethanolamine plasmalogens. *Food Chemistry* 28(3); 1988; 197-205

- 2881 Zahurul Haque and Kinsella (JE). Emulsifying properties of food proteins. Bovine serum albumin. *Journal of Food Science* 53(2); 1988; 416-420

Mutton

- 2882 Bartholomew (DT) and Osuala (CI). Use of the InfraAnalyzer in proximate analysis of mutton. *Journal of Food Science* 53(2); 1988; 379-382

Proximate meat analysis for fat, protein, moisture and ash were performed using the InfraAnalyzer. Results were then compared with values obtained by reference AOAC method. Correlation coeff. of 0.992, 0.867, 0.992 and 0.511 were obtained for fat, protein, moisture and ash, resp. Results from the two methods did not differ significantly (P less than or equal to 0.05). The InfraAnalyzer showed potential for use as a rapid method for proximate analysis of fat, protein and moisture in mutton meat. The correlation coeff. for ash between AOAC and InfraAnalyzer methods was low, but the methods were not statistically different (P less than or equal to 0.05). AS

- 2883 Rajalakshmi (D), Dhanraj (S), Nagin Chand and Govindarajan (VS). Descriptive quality analysis of mutton. *Journal of Sensory Studies* 2(2); 1987; 93-118

In this paper an objective procedure for descriptive quality analysis of mutton has been described which gives various sensory attributes of tenderness, toughness, succulence, and aroma and descriptors for five identifiable levels of each attribute. These were based on panel participation and consensus adequate training to the panel for uniform understanding of the descriptors and the quality stages due to age and conditioning have been provided by such participation. In this paper the screening, selection, training, and performance monitoring of the panel has also been described and this procedure developed was used to study the effect of stunning and conditioning of mutton from Bannur sheep. NGKR

Lamb

- 2884 Aljawad (LS) and Bowers (JA). Water-binding capacity of ground lamb-soy mixtures with different levels of water and salt and internal endpoint temperatures. *Journal of Food Science* 53(2); 1988; 376-378, 382

Ground lamb and textured soy protein mixtures were prepared with and without sodium chloride and with different levels of water, and were cooked to different internal end-point temp. Mixtures with sodium chloride were more firm and contained more bound-type and less free-type water. Increasing the amount of water added to the mixture increased cooking loss, expressible fluid, free type and bound-type water, freezable water, and moisture content; however, mixtures with 20% added water had the same amount of free-type water and expressible fluid as those with 30%. Increasing end-point temp. resulted in increases in cooking loss and decrease in bound type and free type water, but had no effect on firmness. AS

Pork

- 2885 DeFreitas (JJ), Knipe (CL), Molins (RA), Walker (HW), Olson (DG) and Kraft (AA). Effect of sodium erythorbate on residual nitrite, pH and bacterial growth in liver sausage formulated with different levels of mechanically separated pork. *Journal of Food Science* 53(2); 1988; 394-397
- 2886 Defreitas (JJ), Molins (RA), Knipe (CL), Walker (HW), Kraft (AA), Olson (DG) and Marcy (JA). Effect of mechanically separated pork, sodium erythorbate and sodium nitrite combinations on *Clostridium sporogenes* survival and growth in liver sausage. *Journal of Food Science* 53(2); 1988; 398-401
- 2887 Isabel Guerrero Legarreta, Usborne (WR) and Ashton (GC). Extending the retail storage time of pork sausage using modified atmospheres and freezing. *Meat Science* 23(1); 1988; 21-36

Two experiments were conducted to evaluate the effect of different gas mixtures on the keeping quality of fresh pork sausages. The modified atm. consisted of combinations of oxygen, carbon dioxide, and nitrogen. In the first exp., 15 gas combinations of these two gases plus oxygen were evaluated. The samples were stored at 5 °C for up to 16 days. The variables used to evaluate the quality of the sausages included acceptability, hardness, cohesiveness, hue, pH, total plate counts, coliforms, and water holding capacity. The results showed a negative effect of oxygen upon most of the variables. Based on these results, the second exp. was designed to evaluate the effect of frozen storage upon the quality of the samples against non-frozen storage (5 °C). Six gas combinations of carbon dioxide and nitrogen were used. The results favoured frozen storage and high carbon dioxide levels (60% to 80%). AS

- 2888 Palumbo (SA). The growth of *Aeromonas hydrophila* K 144 in ground pork at 5 °C. *International Journal of Food Microbiology* 7(1); 1988; 41-48

The influence of NaCl, pH, atmosphere and background microflora on the growth and/or survival of *Aeromonas hydrophila* K 144 was studied in ground pork held at 5 °C. In ground pork, *A. hydrophila* was sensitive to pH values below 6.0 in the form of either a low starting pH in the pork itself or induced by lactic acid bacteria action on

added glucose. Growth of the organism is inhibited by NaCl levels of 3% (w/w) (approx. 4% brine content). *A. hydrophila* grew in vacuum-packaged ground pork; its growth was diminished by the presence of the naturally occurring meat microflora. Except for pH values below 6.0, conditions which inhibited growth of *A. hydrophila* in ground pork can be controlled by factors such as NaCl, pH, and background microflora. In general, measures designed to control other foodborne pathogens appear adequate to limit *A. hydrophila*. AS

- 2889 Rhee (KS), Leu (R), Ziprin (YA), Keeton (JT), Bohac (JJ) and Cross (HR). Minimization of oxidative flavour deterioration in refrigerated, batter-breaded restructured pork nuggets by glandless cottonseed flour in the meat or coating. *Journal of Food Science* 53(2); 1988; 388-390

Meat products

Bacon

- 2890 Post (LS), Lee (DA), Solberg (M), Furgang (D) and Specchio (J). Development of staphylococcal toxin and sensory deterioration during storage of nitrogen and vacuum packaged nitrite free bacon-like product. *Journal of Food Science* 53(2); 1988; 383-387

Toxin production by *S. aureus* was studied in nitrite-free bacon-like product packaged in air permeable film, vacuum packages, and packages flushed with nitrogen during storage at 8, 12, or 26 C. Product wrapped in air permeable film deteriorated rapidly at 26 C and was rejected by sensory evaluation prior to staphylococcal enterotoxin detection. Enterotoxin was not detected in vacuum or nitrogen flushed packages stored at 26 C. Samples stored at 12 C supported *S. aureus* growth although enterotoxin was not detected at 12 or 8 C in any packaging environment. The potential for staphylococcal food poisoning resulting from the production of a nitrite-free bacon-like product was limited under the condition studied. AS

Ham

- 2891 Kemp (JD), Langlois (BE), Akers (K), Means (WJ) and Aaron (DK). Effect of storage temperature and time on the quality of vacuum packaged dry-cured ham slices. *Journal of Food Science* 53(2); 1988; 402-406

Sausages

- 2892 Marcy (JA), Kraft (AA), Hotchkiss (DK), Molins (RA), Olson (DG), Walker (HW) and Merkenich (K). Effects of selected commercial phosphate products on the natural bacterial flora of a cooked meat system. *Journal of Food Science* 52(2); 1988; 391-393, 577

Four commercial phosphate blends and a neutral pyrophosphate were used at three levels (0.30-0.65%) in the preparation of cooked sausage. Control treatments contained no phosphate. Vacuum packaged sausage was stored at 5 C for 21 days or held at room temp. (20-22 C) for upto 48 h after 7 days of refrigerated storage. Mesophilic and facultative anaerobic bacterial counts were highest in control treat-

ments after 14 and 21 days at 5 °C and after 24 and 48 h at 20-22 °C. For each phosphate, the level of addition was the determining factor in bacterial inhibition, since the highest phosphate level resulted in the lowest bacterial counts in sausage held at 5 °C and 20-22 °C. The level of phosphate was more important in prolonging shelf-life than was the type of phosphate. AS

Meat proteins

- 2893 Foegeding (EA). Thermally induced changes in muscle proteins. *Food Technology* 42(6); 1988; 58-64

Thermal processing is generally required in the manufacturing of processed meats. Heat affects the colour, flavour, juiciness, texture of meat. Changes in texture and juiciness are due to thermally driven denaturation (unfolding) and subsequent association of proteins. Which emphasize the critical importance of these reactions to the chemistry of muscle foods. Protein unfolding and protein-protein interactions affect the textural properties of processed meats. This review deals with reversible protein denaturation, irreversible protein denaturation, protein-protein interactions, texture development (gelation) and water holding properties. 41 references. GAR

Poultry

Chickens

- 2894 Ang (CYW), Cenciarelli (M) and Eitenmiller (RR). A simple liquid chromatographic method for determination of B vitamins in raw and cooked chicken. *Journal of Food Science* 53(2); 1988; 371-375

Four forms of vitamin B₆ (B₆ vitamers) in various chicken tissues were determined by a liquid chromatographic method. The vitamins were extracted from the tissues with metaphosphoric acid and separated on a C₁₈ reverse phase column followed by fluorescence detection. Recoveries of added vitamins at two concn were mostly between 84.5% and 107.9%. The most abundant form of B₆ in raw tissues was pyridoxal phosphate (PLP) followed by pyridoxamine phosphate (PMP). Cooked tissues contained more PMP than PLP. The levels of pyridoxal (PL) and pyridoxamine (PM) were relatively low. Data also indicated a net increase of PMP and PM vs a decrease of PLP and PL during cooking. AS

Chickens

- 2895 Gifford (SR), Clydesdale (FM) and Damon (RAJr). The psychophysical relationship between colour and salt concentration in chicken flavoured broths. *Journal of Sensory Studies* 2(2); 1987; 137-147

Taste panelists evaluated the effect of colour on salt perception in chicken flavoured samples using magnitude estimation. Samples were coloured to simulate commercial chicken broth. Five colour intensities were added to 5 NaCl concn ranging from 0.34 to 0.66% (w/v). Colour had no influence on salt perception. Panelists were able to perceive colour difference among samples ($P < 0.001$) and

these were correlated with the objective colour function $\cot^{-1} (a/b)$ calculated from the L, a, b values obtained from the Gardner XL 23. Overall flavour preference was evaluated by a taste pane using the technique of magnitude estimation. NaCl concn ranged from 0.52 to 0.80% (w/v). Overall flavour preference was unaffected by colour. A reduction in NaCl concn for 0.80% (w/v) to 0.52% (a 35% reduction) did not alter flavour preference. A 50 member consumer panel using a paired comparison test found no difference in flavour preference between an uncoloured sample containing 0.80% (w/v) NaCl and a coloured sample containing 0.72% (w/v) NaCl. AS

- 2896 Kijowski (JM) and Mast (MG). Effect of sodium chloride and phosphates on the thermal properties of chicken meat proteins. *Journal of Food Science* 53(2); 1988; 367-370, 387

Max. thermal transition (T_{max}) and denaturation enthalpy (H) of water-washed myofibrils and finely cut chicken breast muscle, treated with 1-4% NaCl and/or 0.25-1% of either pyrophosphate (PP) or tripolyphosphate (TPP), were monitored by differential scanning calorimetry. Increasing the concn of NaCl destabilized the heat resistance of the proteins in water-washed myofibrils and in meat specimens. Actin showed the greatest reduction of T_{max} a 16 °C decline in the presence of 4% NaCl. In a meat system, the addition of 4% NaCl resulted in one T_{max} instead of five transistions, as seen in untreated meat. The presence of PP and TPP, especially in concn of 0.25 and 0.50%, enhanced the thermal stability of myosin. Changes in denaturation temp. of proteins were accompanied by corresponding changes in H . AS

- 2897 Smith (DM), Alvarez (VB) and Morgan (RG). A generalized model for predicting heat-induced chicken myofibrillar protein gel strength. *Journal of Food Science* 53(2); 1988; 359-362

A generalized mathematical model was developed for predicting effects of temp. time history (TTH), protein concn and pH on the strength of heat-induced chicken myofibrillar protein gels. A pseudo first-order kinetic model was used to describe integral TTH effects of protein denaturation on an apparent viscosity index. A reaction threshold temp. of 30 °C and a denaturation activation energy of 20 Kcal/mole were calculated. No significant increase in viscosity index was observed at TTH values above 1.0×10^{10} K-sec. Max. viscosity index was observed at pH 6.0. The effect of protein concn on viscosity index was modeled as a logarithmic function. A prior modeling approach based on fundamental theories can be used to predict the strength of gels under various processing conditions. AS

Broilers

- 2898 Kijowski (JM) and Mast (MG). Thermal properties of proteins in chicken broiler tissues. *Journal of Food Science* 53(2); 1988; 363-366

The thermal behaviour of breast and thigh muscles, blood and skin tissues of chicken broilers was evaluated by differential scanning calorimetry (DSC). Onset temp. of transition (t_0), max. thermal transition (T_{max}) temp. and denaturation enthalpy (H) were evaluated.

Breast muscle exhibited a complex thermogram with five endothermic transitions at 57, 63, 67, 73, and 78 C at a heating rate of 10 C/min. Thigh muscle exhibited only three major transitions at 60, 66 and 76 C. Thermal curves of isolated protein fractions indicated that the thermal transitions in muscle corresponded to the denaturation of myosin, sarcoplasmic proteins, collagen and F-actin. An increase in the heating rate from 1.0 to 44 C/min significantly elevated the onset temp. of transition and major transition temp. as well as the enthalpy of denaturation. Enthalpy of the muscle system heated to various end-point temp. cooled and reheated, showed that myosin was completely denatured at 60 C, sarcoplasmic proteins at 70 C and actin at 80 C. AS

Poultry products

Eggs

Egg products

- 2899 Wood (SL) and Waiter (WM). Factors affecting the occurrence of *Bacillus cereus* in liquid whole egg. *Food Microbiology* 5(2); 1988; 103-107

Bacillus cereus was isolated from various sites at an egg laying station, from raw and pasteurized liquid whole egg and from bakery and retail products made with liquid whole egg. Melange and melange buckets (both washed and unwashed) had particularly frequent contamination, as did samples from the raw mix and holding tanks. After pasteurization, *B. cereus* was isolated less readily, suggesting that most of the initial contamination was in the form of vegetative cells. Spores produced by the isolated on laboratory media resisted heating at 80 C for 60 min and treatment with disinfectants. The results indicate that more rigorous exclusion of bodily cracked and contaminated eggs, coupled with reduction in the use of melange and increased cleaning and disinfection, particularly at the egg laying station, would reduce the levels of *B. cereus* in the pasteurized liquid whole egg. AS

Egg yolk

- 2900 Hatta (H), Sim (JS) and Nakai (S). Separation of phospholipids from egg yolk and recovery of water-soluble proteins. *Journal of Food Science* 53(2); 1988; 425-427, 431

Lipoprotein and water-soluble proteins were separated from egg yolk with sodium alginate. Ninety-nine percent of the lipids were precipitated and 20% of protein remained in the supernatant by this treatment. SDS-PAGE showed the presence of Alpha-, Beta-, Gamma-livetins in the supernatant. Phospholipids were purified from the precipitated lipoproteins by 95% ethanol extraction, then zinc chloride precipitation, and subsequent acetone washing. Phospholipids recovery and purity were 78.5% and 95.9%, resp. Phospholipids thus purified gave a clear colourless, solution in chloroform and were free of triglycerides and cholesterol on TLC plates. AS

- 2901 Pike (OA) and Peng (IC). Effect of protein disruption by denaturation and hydrolysis on egg yolk lipid oxidation. *Journal of Food Science* 53(2); 1988; 428-431

Egg yolk (20%, w/w) was added to 1,3, and 6M guanidinium chloride (GndCl) solutions and agitated at 23 C. Thiobarbituric acid reactive substance (TBARS) were measured over a 2 wk period. Increasing concn of GndCl resulted in more rapid development of TBARS. Disodium ethylenediamine tetraacetate (EDTA; 2.0%) inhibited the formation of TBARS in 6M GndCl treated yolk, indicating a metal catalyzed reaction. Protein hydrolysis using 1% papain in the presence of added iron (ferric chloride) produced a significant increase ($P < 0.01$) in conjugated dienes (233 nm) and trienes (270 nm). Increased lipid oxidation upon denaturation or hydrolysis of the protein moiety suggests that the ordered structure of lipid in the form of lipoprotein may partially account for the inherent oxidative stability of native yolk. AS

- 2902 Sahu (BB) and Panda (PC). Emulsifying property of egg yolk. A review. *Indian Food Industry* 7(3); 1988; 14-17

The article gives the information regarding physico-chemical properties of egg yolk and its application to preparation of certain food products like salad dressing, mayonnaise, baking products and non-edible products as shampoo, tanners yolk etc. GP

SEAFOODS

- 2903 Johnsen (PB), Civile (GV) and Vercellotti (JR). A lexicon of pond-raised catfish flavour descriptors. *Journal of Sensory Studies* 2(2); 1987; 85-91

A standardised descriptive language for evaluating the flavour of pond-raised channel catfish has been described. It also covers sample selection, sample preparation, development of catfish flavour, lexicon selection of flavour references, adaptation of off-flavour quality standards etc. These terms should find use in quality control and new product development in the fish processing industry. NGKR

Fish

- 2904 Abul Hossain (M), Furuichi (M) and Yone (Y). Cultivation of yeast in medium containing liquid from fish waste juice. *Bulletin of the Japanese Society of Scientific Fisheries* ('Nihon Suisan Gakkai-shi') 54(3); 1988; 469-471

Attempts were made to utilise the liquid obtained from the mackerel waste juice as a nutrient source. Yeast, *Saccharomyces cerevisiae* IFO 2114, grew satisfactorily in 75% seawater containing 2.5% of liquid from press juice. 1% glucose or molasses added as carbon source into the culture medium accelerated growth of the yeast. The stationary phase was observed after 30 h from beginning of the

yeast culture. These results indicated the possibility of large scale culture for yeast by use of the liquid prepared from fish waste juice. SGB

- 2905 Islam (NM), Motohiro (T) and Kimura (T). Antibacterial characteristics of fish protamines. VII. Interaction between clupeine sulphate and the cytoplasmic membrane of *Bacillus subtilis*. *Journal of General and Applied Microbiology* 33(6); 1987; 481-487

The interaction between clupeine sulphate (a protamine from herring milt) and the cytoplasmic membrane of *Bacillus subtilis* was investigated. Protoplasts of *B. subtilis* was lysed by clupeine and the lytic effect was directly proportional to the concn of clupeine and time exposure. The antibacterial action of clupeine was reversed by anionic phospholipids and the cell membrane of the bacterium. Clupeine was also found to bind and form a complex with the phospholipids. These results indicate that protamine bound primarily to the membrane phospholipids, which may result in damage to the membrane structure and function. AS

- 2906 Islam (NM), Motohiro (T) and Kimura (T). Antibacterial characteristics of fish protamines. VIII. Effect of clupeine sulphate on the membrane-ATPase activity and membrane structure of *Bacillus subtilis*. *Journal of General and Applied Microbiology* 33(6); 1987; 489-496

The effect of clupeine sulphate on a vital membrane-bound enzyme (adenosinetriphosphatase or ATPase) was studied. Clupeine stimulated the Mg^{2+} - ATPase activity to 250% of the control level but the stimulatory effect diminished with more than 200 μ g of clupeine/ml. Considering the vital metabolic functions of this enzyme it appears that the stimulatory effect of clupeine on this enzyme may contribute to the destruction of membrane function. Phosphatidylethanolamine, a typical membrane phospholipid inactivated and blocked the stimulatory effect of clupeine on the ATPase activity. In view of the strong interaction between clupeine and membrane lipids, the effect of clupeine on the membrane structure of *Bacillus subtilis* was studied by incorporating a hydrophobic fluorescent dye (1,6-diphenyl-1,3,5-hexatriene) mol. in the isolated cell membranes. Clupeine increased the fluorescence intensity and decreased the fluorescence polarization of the membrane dye environment. This indicated a structural change in the cell membrane. AS

- 2907 Kitabatake (N), Shimizu (Y) and Doi (E). Continuous production of fish meat sol using a twin-screw extruder. *Journal of Food Science* 53(2); 1988; 344-348

The washed minced meat of flying fish was extruded at low temp. with NaCl in a twin-screw extruder while varying screw rotation, feeding rate, feeding of NaCl and barrel temp. Extrusion at a higher screw rotation and moderate feeding rate with the residence time of about 1 min, using NaCl in solution and with cooling by ice water, gave the most adhesive meat sol. Heat-induced gel from this meat sol had a similar textural parameters measured by an instrument to the gel prepared with a conventional stone grinder, however, the toughness

score in sensory test of the gel prepared by extrudate was a little smaller than the gel by a conventional method. AS

- 2908 Nambudiri (DD) and Gopakumar (K). Cold shock reactions in tropical fishes. *Journal of Food Science and Technology, India* 25(2); 1988; 89-91

The problem of cold shock reactions in several species on marine, fresh water and brackish water fishes was investigated and the cold shortening was compared with rigor mortis set in fish at room temp. Stiffening was found to occur more rapidly at 0 C than at room temp. in all the species studied. Significant differences in pH, ATPase activity and glycogen content were noticed between stiffened muscles. At 37 C an intense thermal shock was obtained in fishes. MVG

- 2909 Obatake (A), Doi (T) and Ono (T). Post-mortem degradation of inosinic acid and related enzyme activity in the dark muscle of fish. *Bulletin of the Japanese Society of Scientific Fisheries ('Nihon Suisan Gakkai-shi')* 54(2); 1988; 283-288

In order to elucidate the degradation of inosinic acid (IMP) in the dark muscle of fish, the levels of adenine nucleotides and their related compounds were compared in the white and dark muscle of yellow tail *Seriola lalandi* and in common mackerel *Scomber japonicus* during iced storage. The struggling of 30 min before death affected the degradation rate of IMP ion in the dark muscle of yellow tail and not in the white muscle. During iced storage, the degradation of IMP was very rapid in the dark muscle of common mackerel. IMP was degraded optimally at pH 6 and pH 8 ion muscle homogenates of common mackerel. The enzyme activity in the dark muscle homogenate at pH 6 was 5 times that in the white muscle homogenate, whereas the activity at pH 8 was nearly the same in both the muscle homogenates. The fact that the high activity at pH 6 was present in the supernatant of the dark muscle homogenate indicated that this enzyme was easily soluble in water. In view of these findings, the fact that the pH of dark meat in fish such a mackerel falls quickly to around 6 after death, suggests that the enzyme activity is mainly responsible for the rapid degradation of IMP in the dark muscle. SGB

- 2910 Ravn Jorgensen (B), Gibson (DM) and Huss (HH). Microbiological quality and shelf life prediction of chilled fish. *International Journal of Food Microbiology* 6(4); 1988; 295-307

A number of storage experiments have been carried out with whole cod and vacuum-packed cod fillets stored in ice. The microbiological quality of the fish was determined on the basis of detection time estimated rapidly by conductance assays in a TMAQ-containing medium at 25 C. Detection time and sensory data have been incorporated into a predictive linear model to estimate the remaining shelf life of the products. It is concluded that the shelf life of iced whole cod can be predicted using this model but not that of vacuum-packed fillets because of the greater variability of bacterial activity in packaged fish. AS

- 2911 Tanaka (M) and Kimura (S). Effect of heating condition on protein quality of retort pouched fish meat. *Bulletin of the Japanese Society of Scientific Fisheries* ('Nihon Suisan Gakkai-shi') 54(2); 1988; 265-270

Effect of heat processing on fish meat in retort pouches has been examined in connection with its protein quality. Bigeye tuna and halibut meat were heat-processed at two different temp. (115 C and 124 C) varying in F values from 8 to 32. At the F value of 8 or 21, non-specific degradation of peptide bonds in the fish meat proteins was observed by electrophoresis to occur more slightly at 124 C than at 115 C and their amino acid composition were not significantly changed during the heat processing. Glucose, glucose-6-phosphate, available lysine and in vitro digestibility of the fish meat were also determined in order to reveal the changes of protein quality from the stand point of amino carbonyl reaction. Losses of glucose, glucose-6-phosphate and available lysine followed the first order reaction kinetics during the heat processing, but were smaller at 124 C than at 115 C when compared at equivalent F values. On the other hand, in vitro digestibility of the fish meat decreased only slightly in the course of heat processing. From these combined results, it was concluded that when compared at the equal lethality, the protein quality of heat-processed fish meat in retort pouches could be retained more effectively at 124 C than at 115 C and that at least no remarkable loss in protein quality was observed under the heat processing at 124 C with F=8. AS

- 2912 Wheeler (KA) and Hocking (AD). Water relations of *Paecilomyces variotii*, *Eurotium amstelodami*, *Aspergillus candidus*, and *Aspergillus sydowii*, xerophilic fungi, isolated from Indonesian dried fish. *International Journal of Food Microbiology* 7(1); 1988; 73-78

The water relations of four xerotolerant fungi, *Paecilomyces variotii*, *Eurotium amstelodami*, *Aspergillus candidus* and *Aspergillus sydowii*, isolated from dried salted fish, were examined at 25 C, on media in which water activity was controlled by NaCl or a glucose/fructose mixture. All fungi were less tolerant of NaCl than glucose/fructose at low water activity. *P. variotii* grew 2 to 3 times faster on glucose/fructose media than on NaCl. The min. water activity permitting germination varied from 0.753 for *E. amstelodami* and 0.776 for *A. candidus* and *A. sydowii* to 0.793 for *P. variotii*. At low water activity germination was not always followed by growth. In most cases the min. for growth was 0.02 water activity units above that for germination. AS

Cod

- 2913 Leblanc (EL) and Leblanc (RJ). Effect of frozen storage temperature on free and bound formaldehyde content of cod (*Gadus morhua*) fillets. *Journal of Food Processing and Preservation* 12(2); 1988; 95-113

Samples from the same lot of commercially harvested and processed Northern Bank cod (*Gadus morhua*) fillets were frozen stored at -30 C, -22 C, -15 C, -12 C, and a simulated industrial fluctuating

temp. program for ca. 90 days. Perchloric acid extracts of the frozen premium grade fillets were used for the detn. of free formaldehyde (HCHO) and dimethylamine (DMA). Both the formaldehyde dehydrogenase (EC1.2.1.46) enzyme and the Chochin and Axelrod (1959) modification of the colorimetric method were used to compare the free HCHO content of the extracts. The enzyme procedure consistently detected 21% less HCHO in the fillets during the course of the study. Initial appearance of bound HCHO in the fillets determined as the difference between OMA and enzymatically or colorimetrically assayed free HCHO was influenced by frozen storage temp. The lower concn of HCHO detected by the enzyme method greatly influenced both the free HCHO concn and the initial appearance of bound HCHO in the fillets. First-order reaction rates for free HCHO and DMA were higher at -12 C (P less than or equal to 0.05) than those at -15 C, -22 C, or -30 C but lower than that of the fluctuating temp. conditions. Results also show that both the ratio of DMA and HCHO formation and the ratio of mean DMA and HCHO concn were > 1. A more accurate detn. of free HCHO in frozen stored fish muscle could provide a better understanding of the role of bound HCHO in textural deterioration. AS

- 2914 LeBlanc (EL), LeBlance (RJ) and Blum (IE). Prediction of quality in frozen cod (*Gadus morhua*) fillets. *Journal of Food Science* 53(2); 1988; 328-340

Physical and chemical indices were determined on frozen cod (*Gadus morhua*) fillets stored for ca. 90 days at either -12, -15, -22, -30 C or under a set of simulated industrial fluctuating temp. conditions (SIFTC). Univariate and multivariate statistics on the quality indices gave a relationship between frozen storage textural deterioration and the chemical parameters as influenced by storage temp. Results on the SIFTC resembled the -12 C and -15 C storage treatments. Chemical indices had lower activation energy values than those for the physical parameters. Ammonia, determined enzymatically, can be used as an index of frozen fish quality. The quadratic equations developed using the dependent variable of Instron raw peak force, independent of time and temp. can predict the textural quality of frozen cod fillets. AS

Mackerels

- 2915 Morii (H), Cann (DC) and Taylor (LY). Histamine formation by luminous bacteria in mackerel stored at low temperature. *Bulletin of the Japanese Society of Scientific Fisheries* ('Nihon Suisan Gakkai-shi') 54(2); 1988; 299-305

The present work was carried out to investigate the role of luminous bacteria, particularly *Photobacterium* spp. in relation to histamine formation in different parts of the body when mackerel are stored at low temp. In the viscera of mackerel, *Photobacterium phosphoreum* increased but *Photobacterium leiognathi* decreased during subsequent storage in ice and at 10 C. In the skin, only *P. phosphoreum* was isolated during storage at 10 Degree C and comprised 33.2% of the flora. In the inner muscle, luminous bacteria were not detected and total viable counts (TVC) were extremely low. Increase of

histamine during storage at 10 C was high in the outer muscle and viscera of fish but low in the inner muscle of fish separated from the viscera. The relationship between TVC with luminous bacteria were not detected and histamine content never correlated in every body part. It is, however, apparent that *P. phosphoreum* plays a part in histamine formation in stored fish. Moreover, strains of *P. phosphoreum* isolated from mackerel from large amounts of histamine during incubation in pure culture in ice. It is considered that histamine found in the inner muscle of scombroid fish may be formed principally by diffusion from the viscera and body surface of mackerel. AS

- 2916 Obatake (A) and Tomita (K). Effect of dark muscle on the degradation of inosinic acid in the white muscle of common mackerel. Bulletin of the Japanese Society of Scientific Fisheries ('Nihon Suisan Gakkai-shi') 54(2); 1988; 289-292

It has been shown that inosinic acid (IMP) hydrolyzing enzyme has high activity at pH 6.0 in the dark muscle of common mackerel *Scomber japonicus* and is easily soluble in water. This suggests the possibility that the enzyme in the dark muscle may affect the degradation of IMP in the white muscle homogenate was accelerated by mixing the dark muscle homogenate during a 4 days period of storage in ice. A similar phenomenon was also clearly observed when the minced white muscle was mixed with 10% of minced dark muscle during a 7 days period of storage in ice. After 8 days of storage in ice, when the contents of ATP-related compounds in the white muscle of common mackerel were determined in the fillets with and without the dark muscle, it was observed that IMP was slightly higher and inosine was slightly lower in the fillet without the dark muscle than in the fillet with the dark muscle. These results strongly indicate that the enzyme of the dark muscle affected the degradation of IMP in the white muscle of common mackerel. AS

Menhaden

- 2917 Johnson (JM), Flick (GJ), Long (KA) and Phillips (JA). Menhaden (*Brevoortia tyrannus*). Thermally processed for a potential food resource. Journal of Food Science 53(2); 1988; 323-324

Filleted, dressed, and dark unwashed minced menhaden packed in oil, broth, or preprocessed with alum citric acid brine were evaluated by a trained sensory panel. The filleted and minced menhaden were significantly more firm than dressed products in oil or broth but a preprocess with alum citric acid brine preserved the firmness of the dressed form. The mince product was significantly stronger in flavour and significantly less in flakiness. Chewiness was significantly higher in the filleted products in oil or broth and the minced products. Canned menhaden incorporated in fish and salad rated lower than fish salad prepared with tuna. The filleted packed in oil or broth or the dressed preprocessed in an alum citric acid brine has potential as a canned fish product. AS

Mullets

- 2918 Chiou (T-K) and Konosu (S). Changes in extractive components during processing of dried mullet roe. *Bulletin of the Japanese Society of Scientific Fisheries* ('Nihon Suisan Gakkai-shi') 54(2); 1988; 307-313

Samples of dried mullet roe, at four stages of processing (raw material, salted roe, semidried roe and final product) were analysed for extractive components as well as proximate composition to correlate their changes with the formation of the characteristic flavour during the processing. The protein and lipid contents decreased during the processing, while the ash content increased considerably in the salting process. The extractive N increased continuously throughout the processing, particularly in the sun-drying process. Among the changes in content of various nitrogenous and non-nitrogenous constituents of the extracts, the free amino acids were the most marked; most of them continued to increase during the processing, and the rate of increase was much higher in the sun-drying process than in the preceding process. The total free amino acids content in the final product was twice that was in the raw material. It is noteworthy that the increments of free alanine, glutamic acid, valine, glycine, arginine and methionine, which have been reported to be flavour/taste precursors in some seafoods, were prominent. SGB

Pollack

- 2919 Saeki (H), Ozaki (H), Nonaka (M), Seki (N) and Arai (K). Effect of calcium chloride in frozen surimi of Alaska Pollack on cross-linking of myosin heavy chain in salted paste from the same material. *Bulletin of the Japanese Society of Scientific Fisheries* ('Nihon Suisan Gakkai-shi') 54(2); 1988; 259-264

Five kinds of frozen surimi containing varied concn of CaCl (0-50 mmol/kg) were prepared from Alaska Pollack. The surimi was ground with 3% NaCl at the temp. below 8 °C for 10 min. The salted paste thus obtained was incubated at 15 °C or 30 °C to induce setting (SUWARI). During the incubation breaking stress (BS), protein solubility in SDS-Urea-2-mercaptoethanol medium and subunits composition of the soluble protein by SDS-PAGE were monitored. BS of the paste hardly increased and the protein in the paste was fairly soluble with a setting at 15 °C. On the other hand, at 30 °C BS of the paste increased significantly and protein was insoluble. Also, the rate of decrease in myosin heavy chains (HC) in the pastes indicated that a cross linking of HC strongly occurred at 30 °C but not at 15 °C. It was further found that the highest rate of increase in BS and of decrease in HC were obtained in the pastes from surimi containing 10-20 mmol CaCl per kg; decrease in HC in the paste containing 10 mmol CaCl was three times faster than that in the control samples (without CaCl). These results indicate that CaCl in the salted paste may enhance the gel (KAMABOKO) formation, by acceleration of cross linking reaction between myosin heavy chains. SGB

- 2920 Scott (DN), Porter (RW), Kudo (G), Miller (R) and Koury (B). Effect of freezing and frozen storage of Alaska pollack on the chemical and gel-forming properties of surimi. *Journal of Food Science* 53(2); 1988; 353-358

Alaska pollack was headed, gutted, and frozen at sea in pre- and post-rigor condition. Surimi made from this fish held at -29°C showed a gradual loss in gel-forming ability with time of storage. This loss in gel-forming ability was accompanied by a loss in viscosity and Ca^{++} ATPase activity of the surimi over the 9-month storage period. The gel strength of kamaboko gels showed an inverse linear relationship with gel moisture over a limited moisture range. Simply freezing and thawing pollack resulted in surimi with significantly lower gel strength than that from fresh pollack. AS

Sardines

- 2921 Kasahara (K) and Nishibori (K). Suppressing effect of perilla for odour of sardine. Bulletin of the Japanese Society of Scientific Fisheries ('Nihon Suisan Gakkai-shi') 54(2); 1988; 315-317

To clarify the suppressing effect of perilla for fishy odour, the volatile components of the sardine boiled with pickled "ume" soy sauce and perilla were studied by comparing them with that of the sardine boiled with pickled "ume" and soy sauce. By sensory test, it was found that the fishy odour was distinctly controlled by the addition of perilla. Six carbonyls (acetaldehyde, propionaldehyde, isobutyraldehyde, isovaleraldehyde, benzaldehyde and perillaldehyde), two alcohols (ethyl alcohol and 1-penten-3-ol) and limonene were identified in the head space volatiles of the sardine boiled with pickled "ume" soy sauce and perilla by gas chromatography and gas chromatography-mass spectrometry. But perillaldehyde and limonene of these components were not identified in the volatiles of the sardine boiled with pickled "ume" and soy sauce, and were caused by perilla. By sensory test on the odour of the sardine boiled with pickled "ume" soy sauce, authentic perillaldehyde and limonene, it was confirmed that perillaldehyde greatly contributed to mask the odour specific for the boiled sardine, but limonene didn't play an important part to mask the fishy odour. AS

Tuna

- 2922 Chow (CJ), Ochiai (Y), Watabe (S) and Hashimoto (K). Autoxidation of bluefin tuna myoglobin at around freezing point. Bulletin of the Japanese Society of Scientific Fisheries ('Nihon Suisan Gakkai-shi') 54(3); 1988; 473-478

The effect of storage temp. at around freezing point (-3°C and -6°C) on the autoxidation of bluefin tuna myoglobin (Mb) was examined. Autoxidation rate of Mb tended to decrease with lowering of storage temp. ($0^{\circ}\text{C} > -3^{\circ}\text{C} > -6^{\circ}\text{C}$). Once frozen, however, the Mb showed higher values of met Mb% than that at 0°C ($0^{\circ}\text{C} < -3^{\circ}\text{C} < -6^{\circ}\text{C}$). Discolouration rates of tuna meat during storage at -3°C and -6°C generally were slower than those at 0°C , irrespective of the state of meat. When the meat stored at -20°C or 80°C for 1 to 2 wks remained frozen during a subsequent storage at -3°C and -6°C , it discoloured faster for initial 4 days, but, after then, more slowly than the control meat stored in ice. These results suggested that unfrozen state

is preferable to partially frozen state for storage of tuna meat at around freezing point. AS

White fish

- 2923 Amamo (H), Fusjiyoshi (T) and Noda (H). Changes of body components of whitefish (*Coregonus muskun*) after transplantation in reservoir. Bulletin of the Japanese Society of Scientific Fisheries ('Nihon Suisan Gakkai-shi') 54(3); 1988; 529-536

Whitefish (*Coregonus muksun*) is one of the newly introduced fresh-water fishes to Japan. Little is known about the body components. The present investigation describes the changes in chemical composition of the transplanted fish in a reservoir to cultured fish. Though the proximate composition did not differ much from that of the control fish during 3 months after transplantation, crude fat content thereafter decreased to about one half. Non-protein N content was always lower than that of the control. With regard to free amino acid and fatty acid composition, increase of anserine and polyenoic fatty acids contents and decrease of monoenoic fatty acids contents were characteristic during 2 months after transplantation. When the fish was starved, increase of moisture and anserine contents and decrease of crude protein, crude fat, nonprotein N and histidine contents were remarkable. AS

Fish products

Sausages

- 2924 Satomi (K), Sasaki (A) and Yokoyama (M). Effect of packaging materials on the lipid oxidation in fish sausage. Bulletin of the Japanese Society of Scientific Fisheries ('Nihon Suisan Gakkai-shi') 54(3); 1988; 517-521

During the storage of fish sausage, both degradation of nitrosopigments and development of oxidative off-flavour proceeded in proportion to the oxygen permeability of packaging materials. When sausage was packaged by material of zero oxygen permeability, neither degradation of nitrosopigments nor oxidative deterioration of flavour occurred. As to the protective effect of coloured cellophane against the degradation of nitrosopigments of fish sausage under illumination of sun light and fluorescent light, red colour was the most effective followed by violet, blue and green colour in this order. Orange and yellow colours were not effective. Therefore it appeared that the light of 500-600 nm wave length had the strongest effect on the degradation of nitrosopigments in fish sausage. AS

Jelly fish

- 2925 Huang (YW). Cannonball jellyfish (*Stomolophus meleagris*) as a food resource. Journal of Food Science 53(2); 1988; 341-343

A pilot plant process was developed to produce salted dried jellyfish product from cannonball jellyfish (*Stomolophus meleagris*).

Processed products containing an average of 68% moisture, 5.5% protein, 26% ash and 25% salt were obtained by brining with different mixtures of salt (7.5-25%) and alum (1-2.5%) over 1 wk. Mechanical drying was also tested by using a heat pump system dryer. Chemical and physical analyses and sensory properties of cannonball jellyfish products compared favourably with market products. Levels of Ca, Mg and Fe in the jellyfish were higher than those of Zn and Cu. AS

Oysters

- 2926 Pace (J), Wu (CY) and Chai (T). Bacterial flora in pasteurized oysters after refrigerated storage. *Journal of Food Science* 53(2); 1988; 325-327, 348

Freshly shucked oysters (*Crassostrea virginica*) were chlorinated, sealed in pouches and pasteurized. Chlorination reduced the total plate count by a range of 40% to 90%; pasteurization further reduced the population by 99.9%. During refrigerated storage, the organisms that survived pasteurization were all Gram-positive. By comparison, the predominant organisms found in fresh oysters were Gram-negative. Some organisms survived after heating at 80 C for 10 min, but all were killed after heating at this temp. for 15 min. The facultatively anaerobic plate count gradually increased during storage. The major bacteria surviving after pasteurization and cold-storage were *Bacillus*, *Clostridium*, *Corynebacterium*, *Listeria*, *Peptostreptococcus* and *Staphylococcus*. AS

Prawns

- 2927 Karunasagar (I), Venugopal (MN), Jeyasekaran (G), Segar (K) and Karunasagar (I). Microorganisms associated with prawn pickle spoilage. *Journal of Food Science and Technology, India* 25(2); 1988; 103-104

A study of microorganisms in three samples of commercial prawn pickles showing signs of spoilage indicated that bacteria might have been responsible for spoilage. Some of the bacterial isolates were acid and salt resistant. AS

- 2928 Nip (WK) and Moy (JH). Microstructural changes of ice-chilled and cooked freshwater prawn, *Macrobrachium rosenbergii*. *Journal of Food Science* 53(2); 1988; 319-322

The microstructural changes in ice-chilled and cooked prawn, *M. rosenbergii* were studied with the scanning electron microscopy (SEM) and transmission electron microscopy (TEM) techniques. The SEM study revealed muscle fibers in the control samples were wrapped in bundles by the endomysium and subsequently by the perimysium. During ice-chilling, degradation of these intact structures proceeded gradually. The TEM study showed the organized myofilaments of muscle fiber, presence of M line in the H Zone, and abundance of muscle fiber, sarcoplasm in the controlled sample. During ice-chilling, the disappearance of sarcoplasm and the fine structure of myofilaments in the H Zone was clearly demonstrated. These findings supported previous observations of mushiness development and textural changes under simi-

lar conditions. AS

Scallops

- 2929 Fletcher (GC), Murrell (WG), Statham (JA), Stewart (BJ) and Bremner (HA). Packaging of scallops with sorbate; An assessment of the hazard from *Clostridium botulinum*. *Journal of Food Science* 53(2); 1988; 349-352, 358

Toxin production in shucked scallops by a mixture of 10 strains of *Clostridium botulinum* (types A, B, E, F) was studied using mouse bioassay. Scallops, with or without 0.1% potassium sorbate, were packaged in air-permeable film or vacuum packaged in impermeable film. Two trials were done in which packages were inoculated with different spore levels and held at 4, 10 and 27 °C. Bacterial counts were made on various selective media. Only type A toxin was observed and this only in evacuated packages held at 27 °C. Toxin developed more rapidly in the presence of sorbate. All packages in which toxin was recorded had offensive odours and were visibly spoiled. The potential hazard from botulism is discussed. AS

Shrimps

- 2930 An (H), Marshall (MR), Otwell (WS) and Wei (CI). Electrophoretic identification of raw and cooked shrimp using various protein extraction systems. *Journal of Food Science* 53(2); 1988; 313-318

Proteins were extracted from raw or cooked pink (*Penaeus duorarum*), white (*Penaeus setiferus*) or rock shrimp (*Sicyonia brevirostris*) with five different solutions; water, water homogenate adjusted to pH 8.0, 0.1M NaCl, 1% SDS, or 8M urea. Each extract from each species was analyzed using sodium dodecyl sulphate-polyacrylamide gel electrophoresis (SDS-PAGE). Water extraction showed highly species-specific banding patterns for raw shrimp, while patterns for SDS extracts were not as species-specific. However, SDS extracts provided the greatest information on species variation of cooked shrimp. SDS-PAGE was useful in distinguishing shrimp of different genus. This technique was tested and proven in a blind study to be useful for species identification and detection (within 10% of actual amount) of fabricated products. AS

PROTEIN FOODS

Infant foods

- 2931 Anand (SK) and Singh (RS). Pre-formed enterotoxins of *Staphylococcus aureus* in infant foods. *Journal of Food Science and Technology, India* 25(2); 1988; 92-93

One hundred and two samples of infant foods of different brands were analysed for the presence of pre-formed enterotoxins of *Staphylococcus aureus*. Only two samples contained pre-formed enterotoxin type

B, at a level of 0.70 and 0.34 $\mu\text{g}/20\text{ g}$ of the products as determined by Rocket-immuno-electrophoresis. Both the samples were also positive for pre-formed TDNase. However, no relationship could be established between TDNase and enterotoxin as out of 14 TDNase positive samples only 2 contained pre-formed enterotoxins. AS

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Alcoholic beverages

Beer

- 2932 Leeder (GI) and ReedRJR). Filtration of beer using a deep bed granular media filter. Technical Quarterly, Master Brewers' Association of the Americas 25(1); 1988; 20-26

The performance of deepbed granular media filter for filtration of beer was studied. The media was found suitable to obtain beer of bright beer standards without other filter acids. Suspended materials from the filter beds can be removed by washing the bed with water and the media regenerable by water only. Filter media of different densities could be used to separate different particles suspended in the beer. The economics of the use of such media are also discussed. AS

- 2933 Pfisterer (EA), Krynicki (CI), Steer (JT) and Hogg (WT). On-line control of ethanol and carbon dioxide in high gravity brewing. Technical Quarterly, Master Brewers' Association of the Americas 25(1); 1988; 1-5

The use of process chromatographic system was made to monitor the ethanol and carbon dioxide content of high gravity brewing. The system consisting of a special gas chromatogram and microprocessor was found to be a reliable and precise system to know the ethanol and carbon dioxide content of beer. The device is helpful in controlling ethanol and carbon dioxide concn and help blending the gravity beer with deareated water. NGM

Breweries

- 2934 Bozenhardt (H). Productivity improvement generated from systematically scheduling a brewhouse. Technical Quarterly, Master Brewers' Association of the Americas 25(1); 1988; 10-15
- 2935 Weiss (JA). Energy mangement. Technical Quarterly, Master Brewers' Association of the Americas 25(1); 1988; 33-35

The various measures that could be followed to save energy in brewing establishment are suggested. NGM

Brewing

- 2936 Canales (AM), Garza (R), Sierra (IA) and Arnold (R). The application of a beta-glucanase with additional side activities in brewing. *Technical Quarterly, Master Brewers' Association of the Americas* 25(1); 1988; 26-31

The use of exogenous Beta-glucanase enzymes derived from *Bacillus subtilis*, *Aspergillus niger* and *Trichoderma reesei* in brewing were studied. The enzyme from *Trichoderma reesei* was found to hydrolyse arabinoxylan besides beta-glucans, hence the beer obtained with it exhibited almost same sensory qualities as of a normal malt beer. NGM

Brandies

- 2937 Puech (JL). Phenolic compounds in oak wood extracts used in the ageing of brandies. *Journal of the Science of Food and Agriculture* 42(2); 1988; 165-172

The oak wood extracts used in brandy production are extremely varied because of the different ways in which they are made, by infusion, by boiling or by maceration, with or without prior physical or chemical treatment of the wood. Such extracts release a large quantity of phenolic compounds and a very small amount of partially degraded lignin into the brandy, unlike spirits aged in oak barrels. Among monomer compounds derived from lignin, the presence of vanillic and syringic acids, vanillin, syringaldehyde, coniferaldehyde and sinapaldehyde can be noted. In the wood extracts, phenolic compounds and aromatic acids frequently dominate the ligno-complex and aromatic aldehydes resp. which is not the case in brandies. Two samples of liquid extracts of oak wood displayed statistically different vanillin contents. AS

Wines

- 2938 Lamikanra (O). Aroma constituents of muscadine wines. *Journal of Food Quality* 10(1); 1987; 57-66

Muscadine wines were analysed for their volatile aroma compounds using GC-MS. It was found that higher alcohols and esters of fatty acids were found to be the largest groups of flavour components identified in different relative concn in both types of wines. 2 phenyl ethanol which is often found in muscadine grapes was also found in the wines. This paper describes the gas chromatographic profile of the wine extracts with the table of compounds and their mass spectral data. NGKR

Non-alcoholic beverages

Coffee

- 2939 Clifford (M). What factors determine the intensity of coffee's sensory attributes. *Tea and Coffee Trade Journal* 159(12); 1988; 8-12
- 2940 Lee (S). Supercritical decaffeination. *Tea and Coffee Trade Journal* 180(8); 1988; 3-5

Fruit juices

Grape juices

- 2941 Zouari (N), Romette (J-L) and Thomas (D). A continuous-flow method for the rapid determination of sanitary quality of grape must at industrial scales. *Journal of Chemical Technology and Biotechnology* 41(3); 1988; 243-248

A rapid method for the continuous-flow detn. of laccase activity in grape must has been developed. The system was automated and permitted online measurement with less than 5% error. The feasibility of the system in industrial conditions was proved in vinification plants with grape musts and wines. The capacity of musts to consume oxygen during sulphur dioxide treatments was also followed. AS

Orange juices

- 2942 Michael Naim), Striem (BJ), Kanner (J) and Peleg (H). Potential of ferulic acid as a precursor to off-flavours in stored orange juice. *Journal of Food Science* 53(2); 1988; 500-503, 512

The hypothesis that free ferulic acid in stored orange juice contributes to the objectional aroma of P-vinyl guaiacol (PVG) was tested. Single strength orange juice (SSOJ) contained 185 µg/L free ferulic acid which increased to 316 µg/L after pasteurization. Commercial samples of SSOJ contained 3.7 mg/L free ferulic when incubated at 35 °C for 28 days; incubation at 50 °C, resulted in 9.5 mg/L, while samples kept at 4 °C contained 2.9 mg/L. Simultaneously, PVG content in SSOJ increased by 2- (35 °C) to 3- (50 °C) fold, while addition of ferulic acid accelerated formation of PVG. Inclusion of orange juice with added ferulic acid, produced a less acceptable aroma (laboratory taste panel) than juice incubated without added ferulic acid. AS

- 2943 Sizer (CE), Waugh (PL), Edstam (S) and Ackermann (P). Maintaining flavour and nutrient quality of aseptic orange juice. *Food Technology* 42(6); 1988; 152-159

Hydrogen peroxide is an approved chemical sterilizing agent by Food & Drug Administration. Orange juice is one of the products which benefited from the application of hydrogen peroxide for chemically sterilizing aseptic plastic cartons, thereby possible to pasteurize, cool, aseptically fill, and store the product at ambient temp. This procedure has not received consumer acceptance. Storage temp. is one of the primary factors affecting stability of the product. Vitamin C is degraded by aerobic pathway in plastic packs. GAR

Syrups

- 2944 Vaccari (G), Sgualdino (G) and Vignali (A). Decolorizing action of sodium bisulphite on syrups. *Industries Alimentaires et Agricoles* 104(12); 1987; 1177-1180 (Fr).

Decolorizing activity of sodium bisulphite was superior to that

of sodium sulphite. Recolorization can be prevented in syrups during storage by addition of sodium bisulphite. BV

Tea

- 2945 Devchoudhury (MN) and Bajaj (KL). Effect of potassium on nitrogen and carbohydrate contents of tea leaves (*Camellia sinensis*(L) O. Kuntze) and quality of made teas. *Journal of Food Science and Technology, India* 25(2); 1988; 105-107

High dose of potassium i.e. 180 kg/ha applied to tea bushes, accelerates the conversion of theanine to glutamic acid, which is finally incorporated into proteins. Potassium also appears to help in the conversion of water-soluble carbohydrates to polysaccharides and results in decrease of theaflavins and thearubigins of made teas, thereby affecting its quality. AS

- 2946 Zongmao (C) and Haibin (W). Factors affecting residues of pesticides in tea. *Pesticide Science* 23(2); 1988; 109-118

This paper presents a discussion on residue behaviour of 17 pesticides on tea, on the basis of the research conducted during the last 20 yr. Gas chromatography and thin layer chromatography were the analytical methods used for the residue-study. Among the different factors, sunlight photolysis and growth dilution were the most important factors affecting pesticide persistence in the growing tea plant, while vapour pressure played an important role in loss of pesticide residues during tea infusion process. It is suggested that in studies on pesticide residue behaviour on tea, all these four factors be considered integrally. SGB

FATS AND OILS

- 2947 Anon. Survey by a working party of the DGF 102th report. Steaming of edible fats and oils for deodorization and deacidification II. *FAT Science and Technology* 90(6); 1988; 207-210 (De).

Fats

- 2948 Oderinde (RA) and Oboh (FOJ). The composition of the Pindo (*Arecastrum romanzoffianum*) fruit. *Food Chemistry* 28(3); 1988; 177-186

The pulp and kernel composition, lipid classes, fatty acid composition and distribution of triglycerides and triglyceride composition of kernel fat from *Arecastrum romanzoffianum* palms grown in Nigeria have been studied. The kernel has a moderate fat content. Lauric acid was the dominant fatty acid in whole kernel fat, in kernel fat, in kernel triglycerides and also in the 2-monoglycerides derived from triglycerides by pancreatic lipase hydrolysis. All the fatty acids in kernel triglycerides exhibited a preference for the combined 1, 3-positions except for lauric acid which exhibited a specificity for the 2-position. The trisaturated triglycerides were the dominant

glyceride type and the fatty acid composition of the various glycerides fractions from silver nitrate-TLC suggested a paucity of simple (monoacid) triglycerides and completely unsaturated triglycerides. *Arecastrum romanzoffianum* pulp consisted mainly by carbohydrate. AS

Fatty acids

- 2949 Carter (JP). Gamma-linolenic acid as a nutrient. *Food Technology* 42(6); 1988; 72-82

Linoleic acid is present as major constituent of vegetable oil obtained from corn, safflower, soybean and sunflower, and in an important minor constituent in most other vegetable oils daily consumed in the range of 5-50 g per day per person. Gamma linolenic acid (GLA) is one of the group of polyunsaturated fatty acids known as omega-6 or n-6 essential fatty acids. This article focuses on the nutritional role, safety of GLA, and effects of GLA supplementation. A review with 58 references. GAR

Oils

- 2950 Akoh (CC) and Swanson (BG). Base catalyzed transesterification of vegetable oils. *Journal of Food Processing and Preservation* 12(2); 1988; 139-149

In these studies anhydrous methanolic sodium hydroxide catalyzed transesterification of vegetable oils were found to yield pure methyl esters within one min. at ambient temp. under N. Neither benzene nor phenolphthaline was required to maintain adequate stability of methanolic sodium hydroxide transesterification reagent. Additional esterification with methanolic HCl to convert free fatty acids to methyl esters was not required. It was also seen that neutralization of excess base with 2.0 M HCl stopped saponification. Transesterification catalyzed by 1.0 M methanolic NaOH was reproducible and quantitative. It was found that pentane and diethyl ether were excellent solvents for methanolic sodium hydroxide catalysis. NGKR

- 2951 Belton (PS), Wilson (RH), Sadeghi-Jorabechi (H) and Peers (KE). A rapid method for the estimation of isolated trans double bonds in oils and fats using Fourier transform infra red spectroscopy combined with attenuated total reflectance. *Lebensmittel-Wissenschaft und-Technologie* 21(3); 1988; 153-157

An improved procedure for the estimation of isolated trans double bonds in oils and fats using Fourier transform infra red (FTIR) spectroscopy is described. An attenuated total reflectance (ATR) cell is used in the place of the more familiar transmission cell. Samples are applied directly to the ATR plate thus eliminating the need for dissolution in organic solvents. The short acquisition times of FTIR and the ease of sample application and cleaning of the ATR cell allow for a rapid sample turnover. The dedicated computer of the FTIR system makes possible automated quantitative analysis and digital subtraction of any interfering components. Thus concn of trans isomers of less than 2% can be determined in free fatty acid mixtures whereas

with dispersive infrared methods the lower limit is 15%. The method is demonstrated using commercial margarines. AS

- 2952 Murali (HS), Singh (L), Sankaran (R) and Sharma (TR). Biosynthesis of oil by *Fusarium* spp. *Lebensmittel-Wissenschaft und-Technologie* 20(6); 1987; 296-299

Several isolates of *Fusarium* sp. were screened for oleagenicity by determining total oil content in their mycelial mass after 10 days of incubation at ambient temp. (25-28 °C). A strain identified as *F. semitectum* produced a good amount of biomass and at the same time a good yield of oil (44% on a dry wt. basis). Residual sugar content in the medium was found to decrease from the initial levels of 5.1% to negligible amounts in 10 days of growth. The dry mycelial mass increased from 1.0 g at 2 days incubation to 11.8 g at 10 days incubation. The values of several chemical parameters of the oil were determined; saponification value, 185.1; iodine value 73.1; RM value, 0.9 non-polar fraction, 99.2%; glycolipids, 0.7%; and polar fraction, 0.1%. The oil consisted of palmitic acid (19.0%), stearic acid (11.44), oleic acid (30.8%), linoleic acid (10.8%) and traces of lower acids. AS

- 2953 Panford (JA), Williams (PC) and Deman (JM). Analysis of oilseeds for protein, oil, fiber and moisture by near infrared reflectance spectroscopy. *Journal of the American Oil Chemists' Society* 65(10); 1988; 1627-1634

Wavelength and mathematical treatments were optimized for the detn. of oil, protein, moisture and crude fiber components in the ground seeds of nine oil-bearing crops (rape, flax, sunflower, safflower, sesame, palm kernel, groundnut, soybean and cottonseed) by scanning near-infrared reflectance spectroscopy. Optimum wavelengths, selected for the estimation of various components, were influenced by the algorithm (math treatment) used and differed among crops. The second derivative math appeared to be better suited for the estimation of all constituents. Methods for sample preparation and analytical results are discussed. The accuracy was quite satisfactory for routine quality control and evaluation purposes, and precision was equal to that of standard analyses. AS

Cottonseed oils

- 2954 Chamkasem (N). Gossypol analysis in cottonseed oil by HPLC. *Journal of the American Oil Chemists' Society* 65(10); 1988; 1601-1604

Gossypol in cottonseed oil was selectively separated by the extraction of cottonseed oil with a hexane and N, N dimethyl formamide; water (2:1, v/v) solvent mixture. After filtration, the extract was injected into the HPLC with the elution time less than 15 min. The spectrophotometric method showed 2 to 5 times higher value of gossypol content in different types of glanded cottonseed oil than did the HPLC method. This is probably due to the gossypol derivatives and colouring interferences reacting with p-anisidine to develop colour and increasing the absorbance reading, whereas gossypol was separated

and detected in the HPLC method. AS

Essential oils

- 2955 Lawrence (BM). Progress in essential oils. *Perfumer & Flavorist* 13(2); 1988; 67-76

Covers bergamot oil, caraway oil, and jasmin extracts. BV

Citrus oils

- 2956 Temelli (F), Chen (CS) and Braddock (RJ). Supercritical fluid extraction in citrus oil processing. *Food Technology* 42(6); 1988; 145-150

Citrus and many other essential oils consist of mixture of hydrocarbons of the terpene and sesquiterpene groups, oxygenated compounds, and non-volatile residues. There is a difference in the flavour of the product produced with these processes when compared to that of the original expressed oil. Supercritical fluid extraction technology can be a suitable alternative process for producing citrus essential oils. GAR

Karanja oils

- 2957 Mandal (B), Ghosh Majumdar (S) and Maity (CR). A rapid colour test for the detection of karanja (*Pongamia glabra*) oil in other vegetable oils. *FAT Science and Technology* 90(6); 1988; 239-240

A rapid colour test was developed to detect adulteration or contamination of edible or non-edible vegetable oils with karanja (*Pongamia glabra*) oil either raw or refined with alkali, acid, alcohol or alcohol alkali and bleached. The test is based on the development of an intense orange to bright red colour on contacting the oil with phosphoric acid. The detection limit is 1%. AS

Palm oils

- 2958 Babatunde (OO), Ajibola (OO) and Ige (MT). A modified process for low cost palm oil extraction. *Journal of Food Science and Technology, India* 25(2); 1988; 67-71

Three processing factors were related to the oil extraction efficiency and quality of palm oil in a 2 factorial exp. The three factors were (i) short delays in processing harvested palm fruit bunches, (ii) fermentation of the fruit, and (iii) chopping of the palm fruit bunches removing spikelets for processing. Processing of the spikelets without delay or fermentation yielded the highest oil extraction efficiency (about 87%) and the best quality oil with a free fatty acid content of 2.3% and the lowest carotenoids level. AS

Rapeseed oils

- 2959 Kozłowska (H), Nowak (M) and Zadernowski (R). Rapessed hulls fat characteristics. *FAT Science and Technology* 90(6); 1988; 216-219

Rapeseed hulls found to contain about 14-19% of fat. The analysis of fat obtained from several var. of rapeseed cultivated in Poland showed that it contains less triglyceride (N 10%), more polar glycerides (N-5%) and mono and diglyceride (2%) compared to the fat obtained from cotyledons. It also showed higher acid value and low stability. N

- 2960 Nagy (M), Bonsack (P), Funke (D), Troch (U) and Grunert (S). Miscella bleaching of rapeseed oils. I. Investigations of bleaching kinetics of bleaching earths in rapeseed miscella. *FAT Science and Technology* 90(6); 1988; 219-222 (De).

Kinetics studies of miscella refining of rapeseed oil extracted by petroleum ether showed the same tendency as was observed in case of rapeseed oil refining. It also indicated that the bleaching kinetics of miscella refining is also governed by the same law of velocity as in the case of phase without solvent. N

Rice bran oils

- 2961 Mishra (A), Gopalakrishna (AG) and Prabhakar (JV). Factors affecting refining losses in rice (*Oryza sativa*) bran oil. *Journal of the American Oil Chemists' Society* 65(10); 1988; 1605-1609

The main components responsible for higher than normal refining losses in rice bran oil have been identified as wax and oryzanol. In model experiment where these were into peanut oil individually and in combination increased the refining losses more than control. MNK

Soybean oils

- 2962 Snyder (JM), Frankel (EN), Selke (E) and Warner (K). Comparison of gas chromatographic methods for volatile lipid oxidation compounds in soybean oil. *Journal of the American Oil Chemists' Society* 65(10); 1988; 1617-1620

Volatiles in soybean oil oxidised at different conditions were evaluated by three capillary gas chromatographic methods namely, direct injection, static headspace and dynamic headspace. The major volatile products found in with peroxide values between 2-10 were pentane, hexanal, 2-heptenal, 2, 4-heptadienal and 2,4-decadienal. MNK

- 2963 Yoon (SH), Jung (MY) and Min (DB). Effects of thermally oxidized triglycerides on the oxidative stability of soybean oil. *Journal of the American Oil Chemists' Society* 65(10); 1988; 1652-1656

SPICES AND CONDIMENTS

Nil

SENSORY EVALUATION

- 2964 Lagrange (V) and Norback (JP). Product optimization and the acceptor set size. *Journal of Sensory Studies* 2(2); 1987; 119-136

This review describes product optimisation and the acceptor set size, background and definitions, objectives of optimization, components of optimization, and optimization procedures experimental designs, nature and size of the panels and consumer acceptance measures, use of the acceptor set size measure. NGKR

- 2965 Munoz (AM) and Civille (GV). Factors affecting perception and acceptance of food texture by American consumers. *Food Reviews International* 3(3); 1987; 285-322

Review, 67 references. BV

- 2966 Nalley (CL). Implementation of consumer taste panels. *Journal of Sensory Studies* 2(2); 1987; 77-83

FOOD STORAGE

Nil

INFESTATION CONTROL AND PESTICIDES

Infestation control

Insects

- 2967 De Lima (CPF). Insect pests and post-harvest problems in the tropics. *Insect Science and its Application* 8(4/5/6); 1987; 673-676

Tropical environments provide optimum conditions for insect growth and multiplication in the ideal medium of food stored by humans. Some insects begin infestation in the field and continue attack in storage. Other sp. diapause and remain in cracks and crevices in granaries or feed on grain residues while awaiting the new harvest. Since most of the tropical produce is for subsistence, the losses resulting from several insect attack contribute to malnutrition and famine. In central stores and warehouses commodity management is poor and large amounts are lost to insects. In countries where heavy

insecticide and fumigant pressure is maintained to preserve food stocks, insects rapidly build up resistance. The solutions for the future are to reduce dependence on pesticides and utilize in an integrated way the cultural, biological and physical techniques developed in recent years for safer storage and the successful preservation of strategic reserves for food security. AS

Pesticides

- 2968 Anon. PAN appeals for the ban on 16 pesticides. *Pesticides* 22(11); 1988; 15

The pesticides action network, (PAN) an international watch-dog organisation on pesticides pollution has appealed to the government of India to ban 16 pesticides which were considered hazardous after extensive studies abroad. The 16 including, the 12 known as "the dirty dozen" are parathion, 2, 4, 5, T, paraquat, DDT, aldrin, dieldrin, endrin chlordimefor, DBCP, chlordane, heptachlor, HCH, lindane, EDB, Toxaphene pentachlorophenyl (PCP) 2, 4, 5, T, Endrin and chlordimeform and DBCP are not allowed to be used in India and dieldrin and EDB are restricted by the government. A committee is now examining whether DDT and some other pesticide should be banned. NGKR

- 2969 Campion (DG), Hall (DR) and Prevett (PE). Use of pheromones in crop and stored products pest management. Control and monitoring. *Insect Science and its Application* 8(4/5/6); 1987; 737-741

Reviews the progress made by the Tropical Development and Research Institute (TDRI) in the utilization of pheromones in practical field situations in developing countries. 23 references. BV

- 2970 Egwuatu (RI). Current status of conventional insecticides in the management of stored product insect pests in the tropics. *Insect Science and its Application* 8(4/5/6); 1987; 695-701

Reviews the current status of conventional insecticides in the management of stored product insect pests in the tropics in relation to the available storage methods. Conventional insecticides used in their management, such as permethrin, lindane, pirimiphos-methyl, phostoxin, methyl bromide and iodofenphos, and their methods of application are also discussed. BV

- 2971 Mohanty (KK), Chakraborty (DP) and Roy (S). Insecticidal properties of some indigenous plants against stored grain pests. *Science and Culture* 54(6); 1988; 207-209

- 2972 Saxena (RC). Antifeedants in tropical pest management. *Insect Science and its Application* 8(4/5/6); 1987; 731-736

Practical usefulness of antifeedants derived from plants neem, *Azadirachta indica* A. juss, Chinaberry, *Melia azedarach* L., and *Warburgia* spp. for management of insect pests in stored grains is reviewed. 48 references. BV

Insecticides

- 2973 Kay (IR) and Collins (PJ). The problem of resistance to insecticides in tropical insect pests. *Insect Science and its Application* 8(4/5/6); 1987; 715-721

The development of resistance to insecticides in insect pests is an important and increasing problem. As insecticide use increases in tropical areas, the numbers of resistant insect strains will increase. The adverse effects of insecticide resistance include crop losses, increased production costs, increased environmental hazards, and socio-economic problems. The increasing difficulties and costs of discovering and developing new insecticides together with the widespread occurrence of resistant strains of insect pests include sensible management of their use and the implementation of IPM programmes. The problems of insecticide resistance and strategies for minimizing and managing resistance in tropical areas are discussed using examples of insect pests of stored products, cotton, rice and bananas. AS

- 2974 Yadav (TD). Current status of conventional insecticides in stored product insect management in India. *Insect Science and its Application* 8(4/5/6); 1987; 703-707

DDT and BHC were used prior to 1954 as grain protectant but gradually malathion was adopted as prophylactic spray to 50 mg/m². However, during the continuous usage, doses were enhanced up to 100 mg/m² to meet the level of effective kill. Toxicity studies on different surfaces, seeds, moisture content levels, different insects at different stages and emergence of resistance were carried out with respect to malathion and several newer insecticides. DDVP was incorporated in spray schedule at 100 mg/m². Insect, such as, larva of *Trogoderma granarium* Everts and adults of *Tribolium castaneum* (Hbst), *Rhizopertha dominica* Fab., *Callosobruchus maculatus* Fab., *Lasioderma serricornis* Fab., and *Sitophilus oryzae* Linn. among beetles and *Ephestia cautella* (Wlk), and *Corcyra cephalonica* Staint from moths were found least susceptible to most of the insecticides. Erimfos and deltamethrin were adjudged suitable to superior for large scale use specially as wettable powder and adjudged suitable to sub-tropical conditions. The paper also provides information on currently used insecticides in India, methods of grain storage at rural and organized level and various constraints faced in the developing countries. AS

BIOCHEMISTRY AND NUTRITION

Biochemistry

- 2975 Marickar (Y) and Fattabiraman (TN). Changes in protease inhibitory activity in plant seeds on heat processing. *Journal of Food Science and Technology, India* 25(2); 1988; 59-62

Antitryptic and atichymotryptic activities in seeds were evaluated as affected by heat processing. In red gram, lentil seed, Bengal

gran, green pea, lima bean and green gram, the activity was decreased by 77, 83, 93, 95, 98 and 98% resp. on cooking at 100 C for 3 min. These effects were similar on pressure cooking for 15 min. Antitryptic activity decreased by 56, 70 and 62% resp. in ragi, bajra and Italian millet on preparation of gruels. In sorghum, however the inhibitory activity did not decrease. In unleavened breads, similar effect were found in the four millets. Roasting decreased antitryptic activity by 83%, 87% and 100% resp. in tamarind, groundnut and green pea; in cashewnut this decrease was not found. Antichymotryptic activity was absent in tamarind, Italian millet, bajra and green gram. In other millets, the antitryptic activity was relatively low, and behaved in similar fashion like antitryptic activity on heat processing. In all cases except cashewnut, concn of 0.15M NaCl extractable portion decreased to various levels on heat processing. MVG

Nutrition

- 2976 Fairweather-Tait (SJ), Faulks (RM), Fatemi (SJA) and Moore (GR). Aluminium in the diet. Human Nutrition: Food Sciences and Nutrition 41F(3/4); 1987; 183-192

The Al content of tea leaves and tea made with 1 g leaves and 100 ml water was measured by graphic furnace atomic absorption spectroscopy. Approx. one-third of the Al was extracted from the leaves, giving a mean concn of 3.9 mg/l (range 2.7-4.9) in the tea infusions. A number of foods reputed to contain high levels of Al were analysed and found to contain < 100 µg Al/g, with the exposition of cake (sponge) mixes which contained 0.7-1.3 mg/g, originating from the added raising agent, sodium aluminium phosphate. The effect of pH and fluoride on leaching of Al from cooking utensils were examined. Acidity caused a marked increase but fluoride at a concn of 8 µg/ml had negligible effect. AS

- 2977 Hammink (J). The importance of nutritional value declaration for food and diet advice. Voeding 48(8); 1987; 240-243

The following aspects are discussed with reference to; its general significance; the role of nutritional labelling in dietary recommendations, etc.; nutrients to be declared; saturated/unsaturated fats; cholesterol, dietary fibre, sugar, alcohol, salt, energy, protein, minerals and vitamins in relation to nutritional labelling; prohibited claims and the relative merits of declaration of nutrients content/100 g, per pack, per household measure, etc. BV

- 2978 Shepherd (R), Farleigh (CA) and Wharf (SG). Preferences for salt in different foods and their relationship to availability of sodium. Human Nutrition: Food Sciences and Nutrition 41F(3/4); 1987; 173-181

The most preferred or ideal concn was assessed in four different foods (soup, bread, boiled potato and meat pate) with 32 subjects using a bias-minimised procedure. Results showed a large differences between the ideal concn for the four foods. The potato was lowest with soup next to lowest possibly one the fact that sodium tended to be in the surface layer of potato while in the soup the salt is

already in solution and hence available to the taste receptors more easily than in the pate and bread. A measure of sodium availability using an ion-selective analyser differentiated between the liquid food and solid foods but failed to differentiate between the three solid foods. MVG

- 2979 Thomas (LH) and Winer (JA). Ischaemic heart disease and consumption of hydrogenated marine oils. Human Nutrition: Food Sciences and Nutrition 41F(3/4); 1987; 153-165

Samples of deposit fat taken at post-mortem examination of 27 people who died of ischaemic heart disease were analysed and compared with those of 27 people who had died of unrelated causes. The studies showed that the storage fat of the cases was richer in certain fatty acids of partially hydrogenated marine oil. MVG

- 2980 Trowell (H). Diabetes mellitus and rice. A hypothesis. Human Nutrition: Food Sciences and Nutrition 41F(3/4); 1987; 145-152

Evidence that prolonged consumption of fibre-depleted white rice is diabetogenic is reviewed with special reference to its soluble fibre content. Many cures for this non-insulin-dependent diabetes mellitus (NIDDM) were reported by Ayurvedic physicians over 2000 years ago. They forbade the eating of rice, extremely low in soluble fibre, and prescribed diet based on barley and beans, both being rich sources of soluble dietary fibre. MVG

TOXICOLOGY

Microorganisms

Bacteria

Clostridium perfringens

- 2981 Kondo (F) and Nagasue (S). Gas-liquid chromatographic determination of propionic acid production differentiates between the food-poisoning strains and toxigenic-type strains of *Clostridium perfringens*. Journal of Food Protection 51(4); 1988; 283-288

A comparison of short chain fatty acid composition of the (32) toxigenic types and food poisoning strains of *Clostridium perfringens* by gas liquid chromatography showed the presence of relative amount of propionic acid as one of the major peaks revealing clear differences between the two types of strains. In cooked meat medium containing 2% fructose, all the toxigenic types produced propionic acid whereas food poisoning types lacked the production of this acid. This differential characteristic may be useful in laboratory bacteriology. CTD

Fungi

Penicillium crustosum

- 2982 El-Banna (AA) and Leistner (L). Production of penitrem A by *Penicillium crustosum* isolated from foodstuffs. *International Journal of Food Microbiology* 7(1); 1988; 9-17

Sixty one isolates of *Penicillium crustosum* originating from various foodstuffs were screened for penitrem. The highest producers of penitrem A (4 isolates) were grown in various liquid media. Skimmed milk (2%) potato extract (2%) sucrose (2%) (SPS) medium supported the highest toxin production and *P. crustosum* sp. 1552 was selected as the best producer of penitrem A. Optimal conditions for the production of penitrem A were to grow the isolate sp 1552 (stationary) in 100 ml of SPS medium (with 4% sucrose) in 500-ml flasks for 3 wk at 25 °C with initial pH 5.7. The isolation and purification of penitrem A is described. Approx. 246 mg of pure penitrem A was obtained from 200 flasks each containing 100 ml of SPS medium. AS

Mycotoxins

Aflatoxins

- 2983 El-Gazzar (FE) and Marth (EH). Role of hydrogen peroxide in the prevention of growth and aflatoxin production by *Aspergillus parasiticus*. *Journal of Food Protection* 51(4); 1988; 263-268

Addition of hydrogen peroxide at 0.3 or 0.5% to glucose-yeast salts medium totally prevented growth and after aflatoxin production by *Aspergillus parasiticus* for up to 90 days of incubation at 14 or 28 °C. CTD

Pesticide residues

Endosulfan

- 2984 Dethe (MD), Dharne (PK), Patil (BP) and Kale (VB). Residues of endosulfan and carbaryl on brinjal fruits. *Pesticides* 22(11); 1988; 31-32

Residues of endosulfan and carbaryl on the fruits of brinjal was studied by estimating the residues colorimetrically. A gap of about 3 days was found to be essential as waiting period between spraying of 0.05% endosulfan or 0.2% carbaryl and harvesting of fruits. NGKR

FOOD LAWS AND REGULATIONS

Nil

